INSTRUMENTATION IN HEALTH EDUCATION AND THE ADOLESCENT HEALTH RISK BEHAVIOR SURVEY (AHRBS) INSTRUMENT

A Dissertation

by

MATTHEW LEE SMITH

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

December 2008

Major Subject: Health Education

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Approved by:

Chair of Committee, E. Lisako J. McKyer
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ABSTRACT

Instrumentation in Health Education and the Adolescent Health Risk Behavior Survey (AHRBS) Instrument. (December 2008)

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Chair of Advisory Committee: Dr. E. Lisako J. McKyer

This journal article format dissertation examined aspects of survey research methodology in health education. In the first study, the author examined articles published in *Health Education and Behavior*, *Health Education Journal*, *Health Education Research*, and *International Electronic Journal of Health Education* to assess if authors report survey instrument characteristics and results of psychometric property tests for data collected with survey instruments. In the second study, the author examined the validity and reliability of data collected from 1,992 Indiana middle and high school students with the Adolescent Health Risk Behavior Survey (AHRBS) instrument. The AHRBS instrument was created using the Biopsychosocial Model (BPSM) theoretical framework and investigates the relationships and influences of adolescents' intrapersonal and normative perceptions on alcohol, tobacco, and other drug (ATOD) use. In the third study, the author used reliable measures for the data to conduct mediation analyses to examine the effects of adolescent perceptions of their social environment, such as perceived peer disapproval, perceived parental disapproval,

and perceived peer behavior, on adolescent lifetime inhalant use in the presence of the theorized mediator variable, characteristics of the peer group.

The author concluded the following: (1) published articles in the four health education journals inconsistently reported survey instrument characteristics or results of psychometric property testing for the data collected with survey instruments; (2) systematically eliminating items due to their limited contribution to scale reliability for these data using exploratory factor analyses, confirmatory factor analyses, and calculating internal consistency reliability shortened the AHRBS instrument by 41.18% and improved the reliability of measures for these data; and (3) the effects of perceived peer disapproval, perceived parental disapproval, and perceived peer behavior on adolescent lifetime inhalant use were significantly mediated by characteristics of the peer group as theorized by the BPSM.

Findings of this dissertation have implications for the field of health education. First, survey instrument characteristics and internal reliability coefficients for data collected with instrument scales should be reported in published manuscripts. Second, researchers should examine the validity and reliability of data collected with survey instruments. Third, only reliable measures for the data should be used in statistical analyses.

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CHAPTER I

INTRODUCTION

Health education is maturing as a credible field of study (Torabi, 2004). Partial credit for the advancement of health education is attributed to the growing body of published literature, sophisticated methods of collecting data from participants, and statistical analyses used to generate interpretable findings that translate theory into practice. A charge from predominant figures in health education to produce unique and sophisticated research (Glover, 2004; McDermott, 2000; Torabi, 2004) has served as a catalyst for growing trends of survey research designs (Merrill, Lindsay, Shields, & Stoddard, 2007). While health education research encompasses a wide range of methodologies, quantitative research designs are the most frequently published studies in the health education literature (Merrill et al., 2007). Within these designs, survey instruments are among the most frequently used methods for collecting data from study participants (Merrill et al., 2007).

Complex and laborious methods of determining the validity and reliability of data collected with survey instruments are necessary to enable researchers to evaluate the quality and precision of measures used (Chen, Sheu, & Chen, 2006). In the absence of performing validity and reliability tests on data collected with survey instruments, instrument parsimony and the accuracy of results are compromised. A well-constructed

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This dissertation follows the style of *American Journal of Health Studies.*

survey instrument determined to be valid and reliable for the data may reduce misinterpretation of findings and serve as a valuable tool for other researchers to be used in future research. Performing validity and reliability tests on data collected from survey instruments after each repeated administration and documenting the results has implications for establishing measure reliability, generalizing findings beyond samples, and setting the standard for best practice. To garner the recognition of health education as an established and respected field of study, uniform methodologies and practices should be established, performed, documented, and shared among the research community.

This dissertation is organized into five chapters. The aims of this dissertation are to: (1) identify gaps in current health education publishing practice; (2) provide detailed descriptions of validity and reliability testing methods for data collected with survey instruments; and (3) use parsimonious measures with maximum reliability for the data to statistically analyze data and interpret findings. This chapter (Chapter I) introduces these studies and the overall structure of this dissertation. Chapters II, III, and IV are formatted as journal articles. The first article in Chapter II reports findings from an analysis of the content related to the use of survey instruments and associated psychometric property reporting in articles published in four health education journals: *Health Education and Behavior*, *Health Education Journal*, *Health Education Research*, and *International Electronic Journal of Health Education*. The second article in Chapter III presents results from statistical analyses conducted to assess the factor structure, construct validity, internal consistency reliability, and measures of stability for data

collected with the Adolescent Health Risk Behavior Survey (AHRBS) instrument. The third article in Chapter IV presents results from mediation analyses conducted to test whether characteristics of adolescents' peer groups mediate the effects of adolescents' perceptions of their social environment on adolescent lifetime inhalant use. Chapter V is includes summaries of the components of this dissertation study and conclusions related to the implications of study results.

Chapter II reports the findings from an analysis of the content in articles published in 2006 and 2007 within four health education journals. The purpose of this analysis of the content was to identify reporting practices of journal article authors concerning characteristics of administered survey instruments and results of psychometric property tests for data collected with survey instruments. All 2006 and 2007 issues of *Health Education and Behavior*, *Health Education Journal*, *Health Education Research*, and *International Electronic Journal of Health Education* were analyzed. Articles were included in the analysis only if quantitative data were collected using survey research methodology, which yielded data appropriate for psychometric properties to be calculated. A total of 403 articles were examined for potential inclusion in the analyses. After applying inclusion criteria, the final sample consisted of 203 journal articles. Articles in the final sample were evaluated using a 26-point rubric created by the author.

Chapter III presents results from statistical analyses performed to assess the validity and reliability of data collected with the AHRBS instrument. The AHRBS instrument was developed using the Biopsychosocial Model (BPSM; Irwin & Millstein,

1986) in 2006 to investigate the relationships and influences of adolescent intrapersonal and normative perceptions of alcohol, tobacco, and other drug (ATOD) use. The study contained in this chapter analyzed data collected from 1,992 middle and high school students enrolled in public and private schools in Indiana. Statistical analyses including exploratory factor analyses, confirmatory factor analyses, and internal consistency reliability coefficient calculations were performed to systematically eliminate items and create the most parsimonious and reliable measures for these data. Pearson's *r* coefficient calculations for summed scales were performed to confirm construct validity. Systematically eliminating items due to their limited contribution to scale reliability resulted in the creation of the Smith-Modified version of the AHRBS (SM-AHRBS) instrument.

Chapter IV presents results from mediation analyses performed to examine relationships proposed by Irwin and Millstein (1986) in the BPSM. The primary purpose of the study presented in this chapter was to use measures included in the SM-AHRBS instrument to examine the effects of adolescent perceptions of their social environment, including perceived peer disapproval, perceived parental disapproval, and perceived peer behavior, on adolescent lifetime inhalant use in the presence of the theorized mediator variable, characteristics of the peer group. A series of ordinary least squares (OLS) regression analyses were performed on data from 1,650 Indiana middle and high school students enrolled in public and private schools. Baron & Kenny's (1986) three-step approach was employed to test the relationships between initial, mediator, and outcome variables.

Following Chapter V, appendices are included to provide supplemental documentation related to this dissertation. Appendices include Appendix A (Alphabetical and Chronological List of Reviewed Journal Issues), Appendix B (The Adolescent Health Risk Behavior Survey Instrument), Appendix C (The Smith-Modified Adolescent Health Risk Behavior Survey Instrument), Appendix D (The Smith-Modified Adolescent Health Risk Behavior Survey Instrument Codebook), and Appendix E (Institutional Review Board Documents).

CHAPTER II

INSTRUMENTATION AND PSYCHOMETRIC PROPERTY REPORTING IN CURRENT HEALTH EDUCATION LITERATURE

Introduction

Historically, primary sources of health information were physicians and nurses; however, advancements in the health education field and published literature have enabled health educators to assume this vital role in community health (Merrill, Stoddard, & Shields, 2004). Publishing research findings in the health education literature influences health education practice. Research efforts enable health educators to understand the complexity of human behavior and health, which transcends merely identifying and defining health problems (McDermott, 2000). These efforts guide the development and implementation of health education programs and assist health educators to evaluate the efficacy and effectiveness of health education programs (Merrill, Lindsay, Shields, & Stoddard, 2007). As such, a charge for original, unique, and high-quality research has been voiced by leaders in health education to propel and distinguish the profession (Glover, 2004; McDermott, 2000; Torabi, 2004).

A profession is partially defined and advanced by the literature it publishes (Simons-Morton, 2007). Through published literature, techniques are shared and results reported to give readers the most current information about emerging issues relevant to the field. To measure the sophistication and rigor associated with health education research, it is important to assess the content published in journal articles and determine

how authors obtain the information reported in these publications. In-depth examination of published literature is one method to assess the status, maturation, and direction of a profession (Merrill et al., 2007).

Advancements in social science research are largely attributed to reliable and valid techniques to measure social variables (Ary, Jacobs, & Razavieh, 1996). Survey research is one method used to assess community needs and inform tailored health education programs (Merrill et al., 2007). Self-report survey instruments are tools to measure the degree of, changes in, and contributors to health status and health behavior. Survey instruments are commonly used in health education to collect information to explain and even predict health outcomes. Indeed, a 10-year analysis of representative articles published in health education journals reported that cross-sectional quantitative research design articles are the most common type of research articles published in health education literature (Merrill et al., 2007). Increasing trends in survey research-based articles being published emphasize the need for well-constructed survey instruments.

Various definitions, descriptions, and techniques are available concerning instrument scale reliability testing and construct validity (Anastasi, 1969; Cronbach, 1970; Ghiselli, 1964; Windsor, Baranowski, Clark, & Cutter, 1994). Reliability refers to the internal-consistency of instrument scale items based on scores reported by study participants (Ghiselli, 1964). Validity refers to the extent to which an instrument scale measures what was intended to measure (Cronbach & Meehl, 1955). Reporting psychometric properties for data collected with instrument scales allows researchers to

evaluate how well the scales measure intended latent constructs (should be grounded in established theoretical frameworks; Babbie, 1989; McGrath, 1979) and decide whether the scales are appropriate for use in future research.

Repeated administration of a survey instrument may document psychometric-related consistency or inconsistency of data collected from heterogeneous samples. Although an instrument may exhibit sound psychometric properties in the original version, reliability and validity must be reestablished in each administration of the instrument (Chen, Wang, Yang, & Liou, 2003). This is especially true if the instrument or scale has been modified. Reporting psychometric properties of data collected with instrument scales permits researchers to appropriately alter the length and content of survey instruments and administer more precise and efficient instruments (Birnbaum et al., 2002; Chen et al., 2003; Lottes & Adkins, 2003).

The reliability and validity of data collected with survey instruments is fundamental to research results (Patrick & Beery, 1991). Performing tests to assess the reliability and validity of data collected with survey instruments allows researchers to determine whether instrument scales are useful and may consistently be used to measure social phenomenon across samples (Laukkanen, Halonen, Aivio, Viinamaki, & Lehtonen, 2000). To maintain data integrity, eliminate bias, and obtain valid and reliable results, survey instruments must be carefully created (O'Rourke, 2001). Psychometric property testing serves to provide relatively objective criteria to determine the value of survey instruments (McDowell & Newell, 1996). Unfortunately, methods of establishing reliability and validity for data collected with survey instruments are complex and labor-

intensive (Chen et al., 2003; Fleiss, 1986; Long, 1983; Nunnally & Bernstein, 1994), and thus should be shared among the research community through publication (Birnbaum et al., 2002).

Currently, no journals in the field of health education mandate authors to report characteristics about survey instruments used to collect primary data or psychometric properties of data collected with survey instruments. To date, the extent to which survey instruments are shared or associated psychometric properties of questionnaires are published is unknown. This void indicates that the field lacks a cohesive inventory or repository of information about survey instruments. The aim of this article is to identify the use of survey instruments and associated psychometric property reporting in currently published health education literature.

Method

An analysis of the content related to the use of survey instruments and associated psychometric property reporting was performed using articles published in four health education journals. This analysis assessed each published article's use of survey instruments and psychometric property reporting practice. All 2006 and 2007 issues of *Health Education and Behavior* (*HEB*), *Health Education Journal* (*HEJ*), *Health Education Research* (*HER*), and *International Electronic Journal of Health Education* (*IEJHE*) were analyzed. These journals were selected because their submission guidelines require that articles submitted for publication contain solely health education-

related content. None of the selected journals mandate the inclusion of survey instrument logistics or psychometric property reporting within their author submission guidelines.

Inclusion Criteria

Selected journal articles contained primary or secondary data collected using a survey instrument. Articles were included only if quantitative data were collected using survey research methodology. Omitted journal articles included qualitative research articles, book reviews, editorials, commentaries, conceptual articles, presidential addresses, award papers, perspectives, systematic/literature reviews, policy reviews, non-empirical research, instructions for authors, reference indices, erratum, and articles using data collection methods other than a survey instrument. Articles using survey instruments yielding data inappropriate for psychometric properties to be calculated were omitted as well. For example, survey instruments administered in the form of checklists or rubrics were not included in the current study.

Content Rubric

All articles were evaluated utilizing a 26-point content rubric (Table 1) created by the author to assess instrument-related information published in health education literature. Rationale of content rubric items was based on recommended survey instrument development and design methods (Dillman, 2007). Introduction, methods, results, and discussion sections of journal articles were reviewed for explicitly-stated content concerning instrument design, administration, and psychometric property

reporting. Information from articles meeting inclusion criteria was recorded in the content rubric. To eliminate bias, explicit statements made by article authors were evaluated. No inferences were made about the content. Table 1 depicts content rubric items and associated evaluation categories. Only criteria related to instrument development, instrument administration, instrument characteristics, and reported psychometric properties for data collected with survey instruments were included in this study.

Findings

Sample

Review of all 2006 and 2007 issues of *HEB*, *HEJ*, *HER*, *IEJHE* yielded 403 articles for potential inclusion (128, 68, 169, and 38, respectively). After applying the inclusion criteria, 192 articles were omitted (69, 39, 73, and 11, respectively). The remaining 211 articles were examined for content concerning instrumentation and psychometric property reporting (59, 29, 96, and 27, respectively). Further review of articles for the use of survey research resulted in excluding an additional 8 for not utilizing survey instruments for data collection or using instruments not appropriate for psychometric property calculation or reporting (3, 3, 2, and 0, respectively). For example, a study which administered a survey instrument to program administrators in the form of a checklist to determine common characteristics of similar programs nation-wide was eliminated. The remaining 203 articles formed the final sample (Table 2).

Table 1. Content Rubric Items and Categories Used in Evaluation

Content Rubric Item	Content Rubric Item Choices
What was the journal name?	Journal name recorded
What was the journal volume & number?	Journal volume & number recorded
What year was the article published?	2006, 2007
What was the author's name?	Name of author recorded
What was the article type?	Quantitative, Qualitative, Literature Review, Conceptual, Commentary, Editorial, Secondary Analysis
What was the method of data collection?	Paper, Telephone, Mail, Interviewer-Administered, Internet
Was the instrument for this study created by the authors?	Yes, No
If yes, what was the basis for the instrument's creation?	None Provided, Theory, Existing Instrument, Modified Existing Instrument, Qualitative Methods, Literature, Program Objectives, Previous Research
What was the name of the instrument used?	Name of instrument recorded
What was the survey research design?	Cross-sectional, Longitudinal, Repeated Cross-sectional, Pre-test/Post-test
Was the study theory-based?	Yes, No
If yes, what theory/model was the used?	Name of theory/model recorded
Did the study use a scale or instrument?	Instrument, Scale
What was the research topic of the article?	Research topic recorded
How many items were in the instrument?	Number of instrument items recorded
How many pages was the instrument?	Number of instrument pages recorded
How much time did it take to complete the instrument?	Number of minutes to complete the instrument recorded
What types of items were included in the instrument?	Likert-Type, True/False, Yes/No, Multiple-Choice, Close-Ended, Open-Ended, Ordinal, Categorical, Continuous, Dichotomous, None Provided
What was the response rate for the study?	Response rate recorded in percentage
Did the study use factor analysis?	Principal Components Factor Analysis (PCA), Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), EFA & CFA, None Conducted
Did the authors report instrument psychometric properties?	Yes, No
If yes, what type of psychometric properties were reported?	Cronbach's Alpha, Test-Retest Coefficient, Kappa, Separation Index, Generalizabilty Coefficient, Kudder-Richardson-20, Temporal Stability Coefficient, Factor Loadings
Were Psychometric Properties of previous studies reported?	Yes, No
Was the instrument published within the article?	Yes, No
Was the article based on a study, evaluation, or intervention?	Study, Evaluation, Intervention

Table 2. Frequency of 203 Reviewed Studies Meeting Inclusion Criteria for Review of Psychometric Content

	Year	Overall Articles	Articles Meeting Criteria	Percent of Items Included
HEB				
	2006	65	25	38.5%
	2007	63	31	49.2%
	Total	***128***	***56***	***43.8%***
HEJ				
	2006	34	13	38.2%
	2007	34	13	38.2%
	Total	***68***	***26***	***38.2%***
HER				
	2006	87	44	50.8%
	2007	82	50	61.0%
	Total	***169***	***94***	***55.6%***
IEJHE				
	2006	19	14	73.7%
	2007	19	13	68.4%
	Total	***38***	***27***	***71.1%***

Journal Article Characteristics

The majority of published articles employed quantitative research methodology (41.9%), qualitative research methodology (15.1%), and mixed-methods methodology (9.9%). Table 3 provides details about types of article published in the selected journals in 2006 and 2007. One-hundred twenty-four articles used cross-sectional study designs (61.1%), 36 used repeated cross-sectional designs (17.7%), 34 used pre-test/post-test designs (16.7%), and 9 used longitudinal study designs (4.4%). Of the included articles, 146 (71.9%) reported findings from original research studies and 56 (27.6%) reported findings from intervention studies and program evaluations.

Table 3. Article Types in 2006-2007 Health Education Literature (n = 403)

Article Type	Frequency (%)
Quantitative-based Articles	169 (41.9%)
Qualitative-based Articles	61 (15.1%)
Mixed-Methods-based Articles	40 (9.9%)
Systematic/Literature Reviews	24 (6.0%)
Secondary Data Analysis-based Articles	21 (5.2%)
Conceptual Articles	21 (5.2%)
Commentaries	15 (3.7%)
Book Reviews	11 (2.7%)
Editorials	10 (2.5%)
Acknowledgements	4 (1.0%)
Erratum	2 (0.5%)
Awards	2 (0.5%)
Miscellaneous	23 (5.7%)

Instrumentation in Health Education Literature

Among the final sample (n = 203), 83.3% reported that the instruments used to collect data from participants were newly created by authors of the studies, were modified versions of existing instruments, or a combination of existing instrument scales to comprise one instrument. The remaining 16.7% reported using unaltered existing survey instruments. Table 4 provides detailed information about the basis for instrument creation reported by authors. Of the articles meeting predetermined inclusion criteria, less than half reported using a theoretical framework in their study design (43.3%). The most commonly reported theoretical frameworks were the Theory of Planned Behavior (20.5%), Social Cognitive Theory (19.3%), Transtheoretical Model (12.5%), Social

Learning Theory (10.2%), Health Belief Model (9.1%), and Social-Ecological Model (9.1%).

Paper-and-pencil instruments were most frequently utilized to collect data from study participants (68.0%). Table 5 provides information about data collection instrument formats. Nearly half of the included articles (47.8%) did not report the number of survey items included within their respective instruments. Among that did report the number of items, instrument length ranged from 5 to 108 items. Only 10 articles (4.9%) reported the length of instruments used to collect data in terms of page numbers. Of those reporting instrument page numbers, instruments ranged from 2 to 28 pages. Of the 33 articles (16.3%) that reported the time needed for participants to complete the instrument, completion time ranged from 4 to 120 minutes. Articles most frequently reported using Likert-type (34.4%), ordinal (12.2%), and yes/no (10.5%) instrument item response types, but over 18% did not specify the type of responses that participants were expected to provide. Table 6 provides types of instrument item responses used to collect data from participants in studies.

Table 4. Basis for Instrument Creation (n = 203)	
Article Type	**Frequency (%)**
No Explicit Justification	52 (25.6%)
Unaltered Existing Instrument	44 (21.7%)
Modified Existing Instrument	42 (20.7%)
Program Objectives	24 (11.8%)
Qualitative Methods	16 (7.9%)
Literature	15 (7.4%)
Previous Research Findings	13 (6.4%)
Theory	11 (5.4%)
Pilot Study	3 (1.5%)

*Some articles included more than one basis for instrument creation

Table 5. Methods of Data Collection (n = 203)	
Article Type	**Frequency (%)**
Paper-and-Pencil	149 (73.4%)
Internet	20 (9.9%)
Telephone	19 (9.4%)
Mail	17 (8.4%)
Interviewer-Administered	14 (6.9%)

*Some articles included more than one method of data collection

Table 6. Instrument Item Response Type (n = 203)	
Article Type	**Frequency (%)**
Likert-Type	101 (49.8%)
Ordinal	36 (17.7%)
Yes/No	31 (15.3%)
Open-Ended	21 (10.3%)
Continuous	18 (8.9%)
True/False	11 (5.4%)
Categorical	11 (5.4%)
Multiple-Choice	8 (3.9%)
Dichotomous	7 (3.4%)
Close-Ended	6 (3.0%)
Checklist Response	5 (2.5%)
Rank-Order Response	2 (1.0%)
No Item Information Provided	37 (18.2%)

*Some articles included more than one instrument item type

Psychometric Property Reporting in Health Education Literature

Overall, 119 (58.6%) articles did not report psychometric properties associated with the instrument used in the respective studies. Of the articles that met the inclusion criteria, 10 (4.9%) reported having conducted an exploratory factor analysis (EFA), 7 (3.4%) reported having conducted a principle components analysis (PCA), 3 (1.5%) reported having conducted a confirmatory factor analysis (CFA), and 2 (1.0%) reported using both EFA and CFA. Of the 169 articles that reported using author-created instruments, 16 (9.5%) performed EFA, PCA, or CFA. Of these 169 articles, 71 (42.0%) reported psychometric properties associated with the instrument used in their respective studies. Only 38.3% of articles that used unaltered existing instruments in their study reported psychometric properties associated with the instrument used. Of the articles reporting psychometric properties for data collected in their respective studies or data collected during previous administrations of the instrument used in their respective studies, 89.3% reported Cronbach's alpha reliability coefficients. Table 7 provides details about reported psychometric properties associated with instruments used in current studies. A total of 14 articles (6.9%) reported psychometric properties associated with a previous administration of the instrument, or components of the instrument, used in their respective studies. Of the 169 articles that reported using created instruments, 10 (15.4%) reported psychometric properties associated with a previous administration of the instrument, or components of the instrument, used in their respective studies. Of the 34 articles that reported using unaltered existing survey instruments, 4 (11.8%) reported

psychometric properties associated with a previous administration of the instrument, or components of the instrument. Only 5 (2.5%) published articles meeting inclusion criteria included a version of the instrument or scale used in the reported study.

Table 7. Psychometric Property Type Reporting (n = 203)

Article Type	Frequency (%)
Cronbach's Alpha Reliability Coefficient	74 (36.5%)
Test-Retest Reliability Coefficient	8 (3.9%)
Kappa Coefficient	2 (1.0%)
Temporal Stability Coefficient	1 (0.5%)
Generalizability Coefficient	1 (0.5%)
Kuder-Richardson-20	1 (0.5%)
Separation Index	1 (0.5%)
No Psychometric Properties Reported	119 (58.6%)

*Some articles reported more than one type of psychometric property

Discussion

Research is a critical element for health education's recognition as credible field of study (Torabi, 2004). Study designs, whether qualitative or quantitative, must employ sound methodology to generate accurate findings with practical implications, which may then be translated for utilization by practitioners and academicians (Merrill et al., 2007; Torabi, 2004). Information reported in research-based publications should explicitly detail study methods and procedures to enable readers to comprehend content, determine the study's relevance to their personal practice, and formulate assessments of the feasibility and efficacy of replicating study methodology.

Findings from this review support previous research, which report increasing trends of cross-sectional quantitative research designs in health education literature (Merrill et al., 2007). Health education researchers frequently use survey instruments to collect data intended to ascertain information from participants concerning attitudes, perceptions, beliefs, and behaviors associated with contemporary health issues. The proper development and administration of survey instruments to collect primary data is so critical to the discipline that it is included among the competencies required of entry-level health educators (Bartee, Grandjean, & Bieber, 2004; National Commission for Health Education Credentialing, 2004). Specifically, as identified by the National Commission for Health Education Credentialing, an entry-level health educator should possess the skill to "employ or develop appropriate data-gathering instruments" (2004). In addition, graduate-level competencies encompass the ability of health educators to "develop valid and reliable data collection instruments" (National Commission for Health Education Credentialing, 2004).

In the current study, inconsistent and low levels of reporting existed concerning survey instrument logistics and psychometric property testing. Less than half of the articles meeting inclusion criteria reported information about number of items included in instruments, page length of instruments, types of items included within instruments, or time needed for participants to complete survey instruments. Many articles reported the number or types of items included for a particular scale within the instrument, but most did not report these logistics for the overall instrument. Inconsistent reporting of survey instrument characteristics hinders readers' understanding of the true composition of the

instrument used and its administration process. The absence of consistent reporting of this information also hinders readers' ability to replicate research studies and corresponding findings.

Among articles reviewed for this study, 83.3% used instruments to collect data that were created by the authors of their respective studies, were modified versions of existing instruments, or a combination of existing instrument scales to comprise one instrument. Only 5% reported findings from factor analyses. Without reporting factor loadings associated with data collected with survey instruments, researchers remain uncertain about the construct validity of items intended to measure theoretical constructs. Only 42% of articles reported psychometric properties of the instrument used in the current study, and only 6.9% of articles reported psychometric properties associated with the instrument's administration in previous studies. Although it is encouraged that researchers tailor studies and study materials to the targeted research sample, altering existing survey instruments requires a complex regimen of testing to reestablish and/or confirm the validity of data collected with survey instruments (Chen et al., 2003). Psychometric property testing results should be reported in published articles for each administration of a survey instrument to determine the stability of the data for the instrument and promote reliability and generalizability of findings when compared to previous and/or future studies. The dearth of psychometric property reporting in published health education literature leaves researchers unable to determine potential utility of existing instruments for their own use.

Reporting survey instrument characteristics and psychometric properties in health education publications should be required and viewed as a courtesy to readers. Including logistics about survey instruments, instrument design processes, and psychometric property testing in published articles enables readers and the greater research community to assess the quality of survey instruments used to generate research findings and replicate studies if so desired. Without this information readers are left with partial instructions about how best to locate appropriate research tools to collect data, interpret study findings, replicate studies, or generalize study findings beyond the current administration of the survey instrument. Inconsistent and incomplete reporting of instrument characteristics, instrument development procedures, and instrument testing procedures have implications to compromise the integrity and advancement of health education as a discipline.

Page and word limitations imposed by journals and journal editors may deter authors from including excessive detail as part of a delicate balance to include valuable information relevant to the study and implications for future research. This author recommends that other writers/researchers not omit information about survey instruments used or the methods employed to validate such instruments. Rather, authors should provide as much instrument-related describe information as possible, such as instrument design procedures, instrument administration, and results from former and current psychometric property testing. Table 8 is a recommended checklist to be used by authors prior to manuscript submission.

Table 8. Instrument Characteristics and Psychometric Property Reporting Checklist

_____	Data collection method
_____	Survey research design
_____	Theoretical framework
_____	Instrument name
_____	History of instrument development
_____	Number of instrument items
_____	Number of instrument pages
_____	Minutes needed for participants to complete instrument
_____	Types of instrument item responses
_____	Study response rate
_____	Instrument completion rate
_____	Factor analysis
_____	Current reliability coefficients for data collected with scales
_____	Previous reliability coefficients for data collected with scales
_____	Instrument included in article (or relevant contact information provided)

The author further recommends that journals and journal editors modify manuscript submission guidelines to require psychometric property reporting. Required reporting of psychometrics in health education literature will contribute to more uniform reporting practices and publishing only high-quality studies using survey research (i.e., validated and reliable instruments for the data being reported). The credibility, integrity, and direction of the health education field are dependent upon the literature it publishes.

CHAPTER III

FACTOR STRUCTURE AND PSYCHOMETRIC PROPERTIES OF THE ADOLESCENT HEALTH RISK BEHAVIOR SURVEY (AHRBS) INSTRUMENT

Introduction

Alcohol, tobacco, and other drug (ATOD) use among adolescents is widely recognized as a contemporary health issue in the United States. With rates of lifetime alcohol, tobacco, marijuana, and inhalant use reaching 82.8%, 59.3%, 49.1%, and 10.2%, respectively, among American high school seniors in 2005 (Eaton et al., 2006), prevention and research efforts are seemingly more important than ever. In addition to growing recognition of and attention toward adolescent substance use, researchers would benefit from more valid and reliable assessment tools (Birnbaum et al., 2002) to effectively measure socioecological and psychological factors contributing to adolescent ATOD use.

Social science research, including health education research, has progressed largely because of sedulous statisticians and researchers who have created techniques to test the validity and reliability of data collected to measure social variables (Ary, Jacobs, & Razavieh, 1996). Testing the validity and reliability of data collected with survey instruments enables researchers to determine the extent that social phenomenon may be consistently investigated across demographic samples (Laukkanen, Halonen, Aivio, Viinamaki, & Lehtonen, 2000). Although national survey instruments reporting adolescent ATOD use prevalence rates have been published (Centers for Disease Control

and Prevention, 2008; Johnston, Bachman, & Schulenberg, 2007; Substance Abuse and Mental Health Services Administration, 2007), few have been specifically designed to investigate socioecological, psychological, and behavioral factors associated with adolescent ATOD use.

A survey instrument used to collect valid and reliable data would greatly assist research efforts surrounding adolescent ATOD use, and with repeated administration, could document consistency among variables theorized to be associated with such health-endangering behaviors. The labor-intensive process of creating and testing survey instrument measures emphasizes the importance for researchers to publish detailed descriptions of instrument testing procedures and to share psychometrically sound measures for advancing the understanding of ATOD use and associated factors (Birnbaum et al., 2002).

The Biopsychosocial Model

Among a myriad of theories and models used to explain and predict adolescent health-endangering behaviors, the Biopsychosocial Model (BPSM) is among the most comprehensive theoretical frameworks for conceptualizing and contextualizing the complexity of adolescent health risk behavior. This model depicts the influence of biological maturation on psychological functioning, which through the mediation of risk perception and characteristics of the peer group may predict adolescent risk-taking behavior (Irwin & Millstein, 1992). This author's extensive research did not uncover an instrument based on the BPSM that has been validated for investigating adolescent

ATOD use. Figure 1 is a modified illustration of the BPSM proposed by Irwin & Millstein.

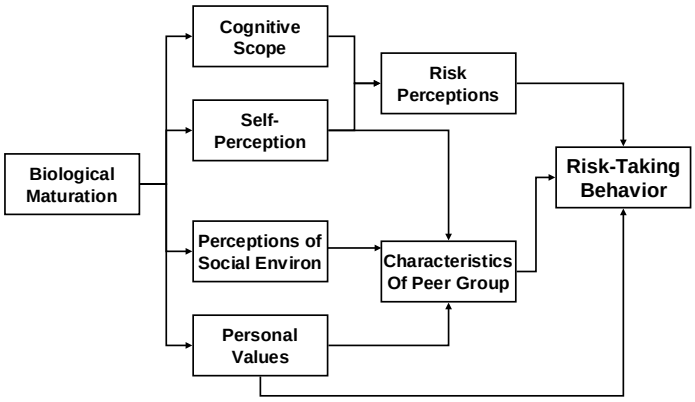

Figure 1. Biopsychosocial model of adolescent risk-taking behavior (Irwin & Millstein, 1992; page 8)

AHRBS Instrument

The Adolescent Health Risk Behavior Survey (AHRBS) instrument was developed in 2006 by Dr. E. Lisako J. McKyer, affiliated with the Indiana Prevention Resource Center (IPRC) at Indiana University – Bloomington. This instrument was a modification of the one originally designed and administered by Dr. Mika Omori (Omori, 2001b). The purpose of Dr. Omori's study was to empirically test the utility of the BPSM (Irwin & Millstein, 1986, 1992; Millstein & Irwin, 1988) to explain and predict adolescent health-endangering behaviors among 808 Japanese college students (Omori, 2001a). The original instrument, developed by Dr. Omori, comprised of adapted scales used within other instruments intended to measure psychological, socioecological, and behavioral contributors to adolescent health risk behaviors (Benthin, Slovic, &

Severson, 1993; Chopak, 1993; Gibbons, Helweg-Larsen, & Gerrard, 1995; Indiana Prevention Resource Center, 1991; Offer, Ostrov, Howard, & Dolan, 1989, 1992).

The AHRBS instrument was altered by Dr. McKyer to specifically investigate the relationships and influences of adolescent intrapersonal and normative perceptions on ATOD use prevalence rates. Items measuring the BPSM's Cognitive Scope and Personal Values constructs were not included in the instrument. Additionally, a majority of items and scales surrounding sexual behaviors and personal safety were removed from the original instrument; however, the ATOD use prevalence scales were expanded by McKyer to encompass a more complete listing of approximately 20 substances (Indiana Prevention Resource Center, 2006).

The purpose of this study is to explore the validity and reliability of data collected with the AHRBS instrument, which was designed to measure the psychological and socioecological factors contributing to ATOD use. This paper evaluates and reports the validity and psychometric properties of data collected with the AHRBS instrument. Specifically, this study utilizes statistical analyses to assess the construct validity, internal consistency reliability, and measures of stability for data collected with the AHRBS instrument.

Method

Sample

The AHRBS instrument was administered to 1,992 middle and high school students in Indiana. Sixth through 12th grade students were sampled. A random sample of public and private, middle and high schools were selected from Indiana schools enrolled to participate in the 2006 Indiana Prevention Resource Center's *Alcohol, Tobacco, and Other Drug Use Survey* (Indiana Prevention Resource Center, 2006). The AHRBS instrument was administered to students in their classrooms. Uniform instructions were provided to participants prior to completing the questionnaire. Participation in this study was voluntary and participants could withdraw at any time. Passive parental consent was obtained.

Instrumentation

The AHRBS instrument contains 190 close-ended Likert-type and multiple-choice items. The 190 items are organized to form 16 distinct scales intended to measure psychological and socioecological factors contributing to adolescent ATOD use. Likert-type scales ranged from 5 to 7 response alternatives (e.g., 1="strongly approve" to 6="strongly disapprove," 1="no risk at all" to 5="very much at risk," and 1="describes me very well" to 7="does not describe me at all"). To date, data collected with the AHRBS instrument have not been previously evaluated to determine their validity or reliability.

Of the 190 items included within the AHRBS instrument, 122 were omitted from this study because they (1) were not contained within a scale, (2) were contained within scales not associated with the BPSM, or (3) were contained within scales measuring the frequency of adolescent ATOD use. A total of 68 AHRBS instrument items were included in analyses performed in the current study. Scale items were reverse-coded as necessary. Table 9 presents theoretical dimensions included within each BPSM construct.

Table 9. Biopsychosocial Model Constructs & Construct Dimensions

Biopsychosocial Model Construct	Construct Dimension
Self-Perception	Impulse Control
	Body Image
	Mastery of the External World
Perceptions of Social Environment	Peer Disapproval
	Parental Disapproval
	Perceived Peer Behavior
Risk Perceptions	Alcohol-Related Risk Perception
	Illicit Drug-Related Risk Perception
	Alcohol-Related Risk Perception for Peers
	Illicit Drug-Related Risk Perception for Peers
	Perceived Risk vs. Benefits
Characteristics of Peer Group	Characteristics of Peer Group

Phase I: Exploratory Factor Analyses

Prior to conducting exploratory factor analyses (EFA), Kaisor-Meyer-Olkin (KMO) and Bartlett's sphericity test were run to determine if the data met criteria for factor analysis (Hair, Anderson, Tatham, & Black, 1998). Tests resulted in a KMO value of 0.900 and a Bartlett's sphericity significance value of 0.000 (X^2 = 65690.660, *df* = 2278, p = 0.000).

Two EFA were performed using Principal Axis Factoring and Varimax rotation with Kaiser Normalization to identify common underlying dimensions in the data. Listwise deletion was used for missing data. Items that did not load strongly (< 0.40) or double loaded (i.e., loaded in more than one factor) were eliminated to effectively define factor composition. Following the initial factor analysis, items were excluded for not meeting inclusion criteria, and a new solution was extracted using Principal Axis Factoring and Varimax rotation.

Phase II: Confirmatory Factor Analyses

Confirmatory factor analyses (CFA) were performed on the data to test the factorial validity of the factors initially defined in the EFA. This method allowed for factor structure comparison and further refinement of the survey instrument (Floyd & Wildaman, 1995). CFA were independently performed using Principal Axis Factoring and Varimax rotation with Kaiser Normalization on each factor that emerged from exploratory factor analyses. Listwise deletion was used for missing data. For CFA, items that did not load strongly (< 0.40) were eliminated in order to define a more precise factor composition. A series of 12 CFA were performed.

Phase III: Psychometric Testing and Further Item Reduction

After reducing the number of items included within scales of the AHRBS instrument using EFA and CFA, psychometric testing was performed on retained items to further modify and refine the instrument. Psychometric tests were performed on

AHRBS instrument scales independently. Cronbach's alpha coefficients, unbiased estimators of scale reliability (Lord & Novick, 1968), were calculated to measure the internal consistency of responses within each instrument scale. Large Cronbach's alpha coefficients indicate that covariance remains equal between items, despite central tendency differences within items (i.e., means, variance). Standardized item alphas were also calculated. Items were systematically removed to identify the most reliable scales for the data (i.e., Cronbach's alpha preferably > 0.70; Jacobson, 1997; McLaughlin & Marascuilo, 1990).

Once establishing the most reliable and parsimonious versions of the AHRBS instrument scales, Cronbach's alphas were calculated for and compared between the (1) unaltered AHRBS instrument scales, (2) AHRBS instrument scales after items were eliminated using EFA and CFA, and (3) finalized AHRBS instrument scales.

Psychometric tests were then performed on data for all participants and 10 independent adolescent sub-demographic categories (i.e., female students, male students, high school students, middle school students, public school students, private school students, high school students enrolled in public school, high school students enrolled in private school, middle school students enrolled in public school, and middle school students enrolled in private school). These analyses were conducted as measures of stability to determine the consistency of data across participants.

Phase IV: Confirming Construct Validity

Construct validity is the extent to which scores within a scale are an indicator of theoretical constructs (Suen, 1990). Analyses were performed on the refined version of the AHRBS instrument to determine how well the AHRBS instrument items and scales measured the intended latent theoretical constructs of the BPSM. Initial construct validity was established using EFA and a series of CFA (Cattell, 1978). Construct validity was then confirmed by calculating correlations between (the summed scores of) theoretical construct dimensions. Pearson's correlation coefficients were calculated between AHRBS instrument scales to test the type and strength of scale associations suggested by the theorized BPSM constructs (Burns & Grove, 1997; McLaughlin & Marascuilo, 1990).

Results

Data were collected from 1,742 Indiana adolescents. Fifty-one percent (n = 894) of respondents were female and 49% (n = 847) were male. Approximately 74% (n = 1278) of respondents were enrolled in high school, 26% (n = 454) enrolled in middle school, 55% (n = 957) enrolled in public school, and 45% (n = 775) enrolled in private school. Table 10 provides cross-tabulations for school type and school level.

Table 10. Cross-tabulation of School Level and School Type (n = 1,732)

		School Type		
		Private	**Public**	***Total***
School Level	**Middle**	222 (12.82%)	232 (13.39%)	454 (26.21%)
	High	553 (31.93%)	725 (41.86%)	1278 (73.79%)
	Total	775 (44.75%)	957 (55.25%)	***1732***

Exploratory Factor Analyses

The initial EFA consisting of 68 items produced a Kaisor-Meyer-Olkin measure of sampling adequacy of 0.900 and a significant Bartlett test of sphericity (X^2 = 65690.660, df = 2278, p = 0.000). The analysis yielded a 15-factor solution with eigenvalues for each factor greater than 1.00 and explained 60.75% of the variance in the model. Preliminary inspection of the scree plot confirmed this multi-factor solution (Portney & Watkins, 2000). Overall, 21 items were eliminated for not meeting inclusion criteria.

Factor analysis of the resulting 47 items identified a 10-factor solution with an explained variance of 60.97%. The KMO test exhibited a value of 0.859 and a significant Bartlett test of sphericity (X^2 = 47356.386, df = 1081, p = 0.000). The scree plot displayed a more manageable set of relatively independent underlying concepts. Results of the second EFA demonstrated that instrument items commonly loaded in factors consistent with the BPSM theoretical framework. Twelve independent scales were created according to theoretical constructs and factor loadings from the second EFA. Instrument items were then evaluated by the author to confirm proper item

inclusion within scales. Table 11 shows the results from the second EFA performed with the remaining 47 items. AHRBS instrument scales measuring theoretical dimensions loading in the same factor were analyzed independently of one another for the remainder of the study to preserve the theoretical framework employed during the development of the AHRBS instrument.

The variance explained by the more parsimonious second factor analysis was not significantly different from the variance explained by the initial factor analysis, despite the reduction of 21 items. This confirms that the eliminated items did not contribute to the overall solution, and thus were justifiably omitted. Table 12 compares descriptives from the initial and second EFA.

Confirmatory Factor Analyses

In this phase, a series of 12 CFA were performed on subsets of variables yielded from EFA. These components were easily interpretable. All twelve scales produced Kaisor-Meyer-Olkin measures greater than or equal to 0.500 and significant Bartlett tests of sphericity. These values indicate compact patterns of data correlations acceptable to yield distinct and reliable scales (Kaiser, 1974), thus confirming all 1-factor solutions. Table 13 provides descriptives for each of the twelve 1-factor confirmatory factor analyses. Two of the 12 scales (i.e., Illicit Drug-Related Risk Perception Scale and Illicit Drug-Related Risk Perception for Peers Scale) yielded KMO values equal to 0.500. These values may be attributed to the scales including only two items each, thus indicating a need to increase the number of variables within these scales.

Table 11. Rotated Factor Matrix for Second EFA

	Factor									
Item (n = 47)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Impulse Control Scale 03							0.427			
Impulse Control Scale 04							**0.596**			
Impulse Control Scale 05							0.489			
Impulse Control Scale 07							0.576			
Body Image Scale 08										
Body Image Scale 09					0.611					
Body Image Scale 11					0.638					
Body Image Scale 12					**0.836**					
Body Image Scale 13					0.641					
Body Image Scale 14					0.529					
Mastery of the External World Scale 15							**0.529**			
Mastery of the External World Scale 16							0.446			
Mastery of the External World Scale 18							0.423			
Peer Disapproval Scale 37		0.658								
Peer Disapproval Scale 38		0.666								
Peer Disapproval Scale 40		0.786								
Peer Disapproval Scale 41		**0.901**								
Peer Disapproval Scale 42		0.773								
Parental Disapproval Scale 43									**0.865**	
Parental Disapproval Scale 44									0.573	
Parental Disapproval Scale 45										
Perceived Peer Behavior Scale 46			0.918							
Perceived Peer Behavior Scale 47			**0.941**							
Perceived Peer Behavior Scale 48			0.803							
Perceived Peer Behavior Scale 49			0.831							
Alcohol-Related Risk Perception Scale 54	**0.919**									
Alcohol-Related Risk Perception Scale 55	0.858									
Alcohol-Related Risk Perception Scale 56	0.864									
Alcohol-Related Risk Perception Scale 57	0.857									
Alcohol-Related Risk Perception Scale 58	0.822									
Alcohol-Related Risk Perception Scale 59	0.699									
Illicit Drug-Related Risk Perception Scale 63				0.792						
Illicit Drug-Related Risk Perception Scale 64				**0.797**						
Alcohol-Related Risk Perception for Peers Scale 66	**0.880**									
Alcohol-Related Risk Perception for Peers Scale 67	0.831									
Alcohol-Related Risk Perception for Peers Scale 68	0.850									
Alcohol-Related Risk Perception for Peers Scale 69	0.680									0.438
Illicit Drug-Related Risk Perception for Peers Scale 71				0.766						
Illicit Drug-Related Risk Perception for Peers Scale 72				**0.780**						
Perceived Risk vs. Benefits Scale 77						0.525				
Perceived Risk vs. Benefits Scale 78						0.689				
Perceived Risk vs. Benefits Scale 79						**0.883**				
Perceived Risk vs. Benefits Scale 80						0.802				
Characteristics of Peer Group Scale 112								0.454		
Characteristics of Peer Group Scale 115								0.522		
Characteristics of Peer Group Scale 116								**0.722**		
Characteristics of Peer Group Scale 117								0.702		

* Rotation converged in 7 iterations.
* The highest loading of each component is printed in bold

Table 12. EFA Comparisions

	KMO	X^2	df	P Value	%Variance	N of Factors	N of Items
Initial EFA	0.900	65690.660	2278	0.000	60.747	15	68
Second EFA	0.859	47356.386	1081	0.000	60.966	10	47

Table 13. AHRBS Instrument Scales: Confirmatory Factor Analyses

AHRB Scale	KMO	X^2	df	P Value	Factor Loading Range	Variance Explained (%)	N of Items Included	N of Original Items
Impulse Control Scale	0.689	1028.944	6	0.000	0.495 - 0.640	33.275	4	7
Body Image Scale	0.804	3220.738	15	0.000	0.585 - 0.838	41.012	6	7
Mastery of the External World Scale	0.627	709.244	3	0.000	0.460 - 0.695	37.615	3	5
Peer Disapproval Scale	0.834	6877.925	10	0.000	0.777 - 0.909	67.920	5	6
Parental Disapproval Scale	0.605	1315.895	3	0.000	0.438 - 0.900	50.042	3	3
Perceived Peer Behavior Scale	0.834	7162.790	6	0.000	0.850 - 0.937	80.386	4	4
Alcohol-Related Risk Perception Scale	0.895	10961.352	15	0.000	0.741 - 0.947	75.490	6	6
Illicit Drug-Related Risk Perception Scale	0.500	1808.486	1	0.000	0.892 - 0.892	79.635	2	6
Alcohol-Related Risk Perception for Peers Scale	0.817	7007.123	6	0.000	0.767 - 0.954	78.420	4	4
Illicit Drug-Related Risk Perception for Peers Scale	0.500	1868.650	1	0.000	0.894 - 0.894	79.919	2	4
Perceived Risk vs. Benefits Scale	0.752	4130.451	6	0.000	0.614 - 0.915	63.084	4	8
Characteristics of Peer Group Scale	0.733	1824.561	6	0.000	0.529 - 0.782	45.676	4	8

Psychometric Testing and Further Item Reduction

In this phase, items were systematically eliminated until maximum reliability for data collected with instrument scales were achieved. An additional 7 items were eliminated from the 47 items included within the CFA. Cronbach's alphas were calculated as measures of internal consistency for data within each of the 12 scales included within the final 40-item instrument. Alpha coefficients for the 12 finalized scales ranged from 0.637 to 0.950. Only two scales (i.e., Impulse Control Scale and Mastery of the External World Scale) yielded Cronbach's alpha coefficients below 0.70 (0.659 and 0.637, respectively). Although values are consistent with psychometric properties reported by other researchers (Omori & Ingersoll, 2005; Patton & Noller, 1994), items should be added to these scales or replaced with other items in attempt to improve their precision in measuring intended theorized constructs.

Cronbach's alphas and standardized alphas were calculated for data for all scales prior to conducting EFA (n of overall items = 68), prior to conducting CFA (n of overall items = 47), and after final item reduction using psychometric evaluation (n of overall items = 40). Table 14 provides psychometric properties for all 12 scales at each aforementioned stage. Cronbach's alpha coefficients remained consistent or improved for all scales, except the Illicit Drug-Related Risk Perception Scale. This scale initially

included 6 items (Cronbach's alpha = 0.897) and was reduced to 2 items (Cronbach's alpha = 0.886). The stability in Cronbach's alpha coefficients despite dramatic item reduction within this scale justifies item elimination to yield a precise and more parsimonious scale. The reliability of the Characteristics of Peer Group Scale was greatly improved through item reduction. This scale initially included 8 items (Cronbach's alpha = 0.083) and was reduced to 4 items (Cronbach's alpha = 0.746).

Additionally, Cronbach's alphas and standardized alphas were calculated for data in all finalized scales for 10 adolescent sub-demographic categories. The purpose of this process was to measure stability of data across adolescent sub-demographic categories. Reliability estimates were similar and consistent across adolescent sub-demographic categories. This finding suggests that participants in each adolescent sub-demographic interpreted and responded to AHRBS instrument items in a consistent manner. This finding further suggests that scales within the AHRBS instrument may be appropriate for data collection among students in different populations and geographical locations. Tables 15, 16, and 17 provide measures of stability for adolescent sub-demographic

Table 14: AHRBS Instrument Scale Psychometrics after Item Reductions

	All Instrument Items				Items Included in CFA				Final Items after All Reductions			
AHRBS Instrument Scale	**N of Items**	**Cronbach's α**	**Standardized α**	**n**	**N of Items**	**Cronbach's α**	**Standardized α**	**n**	**N of Items**	**Cronbach's α**	**Standardized α**	**n**
Impulse Control Scale	7	0.641	0.653	1797	4	0.659	0.662	1819	4	0.659	0.662	1819
Body Image Scale	7	0.780	0.778	1787	6	0.788	0.791	1811	5	0.808	0.808	1820
Mastery of the External World Scale	5	0.623	0.630	1854	3	0.625	0.628	1877	2	0.637	0.637	1895
Peer Disapproval Scale	6	0.903	0.913	1876	5	0.909	0.913	1883	5	0.909	0.913	1883
Parental Disapproval Scale	3	0.585	0.708	1894	3	0.585	0.708	1894	2	0.773	0.778	1898
Perceived Peer Behavior Scale	4	0.933	0.942	1831	4	0.933	0.942	1831	4	0.933	0.942	1831
Alcohol-Related Risk Perception Scale	6	0.947	0.947	1783	6	0.947	0.947	1783	5	0.950	0.951	1798
Illicit Drug-Related Risk Perception Scale	6	0.897	0.900	1762	2	0.886	0.887	1796	2	0.886	0.887	1796
Alcohol-Related Risk Perception for Peers Scale	4	0.933	0.933	1847	4	0.933	0.933	1847	3	0.943	0.943	1859
Illicit Drug-Related Risk Perception for Peers Scale	4	0.866	0.871	1815	2	0.888	0.889	1833	2	0.888	0.889	1833
Perceived Risk vs. Benefits Scale	8	0.902	0.903	1756	4	0.854	0.864	1790	2	0.916	0.916	1807
Characteristics of Peer Group Scale	8	0.083	0.102	1746	4	0.746	0.759	1760	4	0.746	0.759	1760
Total N of Items	**68**				**47**				**40**			

Table 15. AHRBS Instrument Scale Measures of Stability: Sex

		Males			Females		
AHRBS Instrument Scale	**N of Items**	**Cronbach's α**	**Standardized α**	**n**	**Cronbach's α**	**Standardized α**	**n**
Impulse Control Scale	4	0.625	0.630	806	0.686	0.687	839
Body Image Scale	5	0.788	0.791	799	0.806	0.805	840
Mastery of the External World Scale	2	0.659	0.660	829	0.629	0.629	877
Peer Disapproval Scale	5	0.918	0.920	822	0.871	0.878	871
Parental Disapproval Scale	2	0.769	0.778	825	0.723	0.724	883
Perceived Peer Behavior Scale	4	0.846	0.853	805	0.947	0.961	848
Alcohol-Related Risk Perception Scale	5	0.953	0.954	785	0.944	0.945	833
Illicit Drug-Related Risk Perception Scale	2	0.883	0.883	797	0.877	0.878	828
Alcohol-Related Risk Perception for Peers Scale	3	0.942	0.943	816	0.941	0.942	866
Illicit Drug-Related Risk Perception for Peers Scale	2	0.883	0.884	801	0.881	0.882	851
Perceived Risk vs. Benefits Scale	2	0.913	0.913	782	0.900	0.901	849
Characteristics of Peer Group Scale	4	0.745	0.758	757	0.740	0.757	833

Table 16. AHRBS Instrument Scale Measures of Stability: School Level and School Type

		High School Students			Middle School Students			Public School Students			Private School Students		
AHRBS Instrument Scale	**N of Items**	**Cronbach's α**	**Standardized α**	**n**	**Cronbach's α**	**Standardized α**	**n**	**Cronbach's α**	**Standardized α**	**n**	**Cronbach's α**	**Standardized α**	**n**
Impulse Control Scale	4	0.643	0.646	1218	0.656	0.658	417	0.665	0.666	1031	0.650	0.653	788
Body Image Scale	5	0.810	0.810	1211	0.785	0.786	421	0.810	0.810	1033	0.805	0.806	787
Mastery of the External World Scale	2	0.674	0.674	1256	0.566	0.566	440	0.634	0.634	1077	0.642	0.642	818
Peer Disapproval Scale	5	0.901	0.906	1252	0.922	0.924	432	0.910	0.913	1059	0.904	0.909	824
Parental Disapproval Scale	2	0.712	0.723	1263	0.821	0.822	436	0.762	0.768	1071	0.802	0.804	827
Perceived Peer Behavior Scale	4	0.901	0.921	1218	0.977	0.979	426	0.941	0.953	1027	0.847	0.850	804
Alcohol-Related Risk Perception Scale	5	0.948	0.948	1203	0.944	0.946	407	0.950	0.950	1013	0.950	0.951	785
Illicit Drug-Related Risk Perception Scale	2	0.876	0.876	1214	0.900	0.902	403	0.894	0.894	1012	0.873	0.874	784
Alcohol-Related Risk Perception for Peers Scale	3	0.936	0.937	1258	0.946	0.947	418	0.940	0.941	1049	0.945	0.946	810
Illicit Drug-Related Risk Perception for Peers Scale	2	0.884	0.884	1236	0.883	0.885	412	0.900	0.901	1035	0.861	0.864	798
Perceived Risk vs. Benefits Scale	2	0.910	0.910	1225	0.911	0.911	402	0.910	0.910	1006	0.924	0.925	801
Characteristics of Peer Group Scale	4	0.736	0.754	1224	0.769	0.779	364	0.753	0.761	958	0.731	0.754	802

Table 17. AHRBS Instrument Scale Measures of Stability: School Level by School Type

		Public High School Students			Private High School Students			Public Middle School Students			Private Middle School Students		
AHRBS Instrument Scale	**N of Items**	**Cronbach's α**	**Standardized α**	**n**	**Cronbach's α**	**Standardized α**	**n**	**Cronbach's α**	**Standardized α**	**n**	**Cronbach's α**	**Standardized α**	**n**
Impulse Control Scale	4	0.651	0.654	692	0.630	0.632	526	0.650	0.650	209	0.665	0.669	208
Body Image Scale	5	0.813	0.812	689	0.806	0.807	522	0.794	0.796	212	0.778	0.778	209
Mastery of the External World Scale	2	0.677	0.677	713	0.670	0.670	543	0.560	0.562	225	0.574	0.574	215
Peer Disapproval Scale	5	0.903	0.908	708	0.897	0.902	544	0.913	0.916	214	0.935	0.938	218
Parental Disapproval Scale	2	0.678	0.690	716	0.782	0.790	547	0.804	0.805	218	0.856	0.864	218
Perceived Peer Behavior Scale	4	0.911	0.939	691	0.786	0.788	527	0.983	0.985	208	0.882	0.882	218
Alcohol-Related Risk Perception Scale	5	0.950	0.951	682	0.944	0.945	521	0.939	0.940	201	0.947	0.949	206
Illicit Drug-Related Risk Perception Scale	2	0.883	0.883	688	0.864	0.865	526	0.908	0.909	198	0.885	0.889	205
Alcohol-Related Risk Perception for Peers Scale	3	0.937	0.938	715	0.935	0.936	543	0.934	0.935	207	0.957	0.959	211
Illicit Drug-Related Risk Perception for Peers Scale	2	0.886	0.886	704	0.879	0.880	532	0.905	0.906	202	0.830	0.841	210
Perceived Risk vs. Benefits Scale	2	0.910	0.910	694	0.909	0.909	531	0.877	0.877	190	0.948	0.949	212
Characteristics of Peer Group Scale	4	0.750	0.766	692	0.715	0.737	532	0.778	0.781	151	0.744	0.771	213

category data.

Confirming Construct Validity

In this phase, item-total correlations were calculated between scales to provide evidence of construct validity. These analyses yield information about the strength and direction of associations between scales theorized to be dimensions within larger constructs. Twelve scales from the AHRBS instrument were expected to measure 4 theoretical constructs (i.e., Self-Perception, Perceptions of Social Environment, Risk Perceptions, and Characteristics of Peer Group). As expected, scores for theoretical dimensions within the same BPSM constructs were more highly correlated than with theorized dimensions outside of their BPSM constructs. These moderate to high correlations indicate AHRBS instrument scales used to measure theoretical dimensions were adequate to measure the intended BPSM constructs. Table 18 depicts correlations and statistical significance values among AHRBS instrument scales.

Table 18. Correlations among AHRBS Instrument Scales

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	0.286**	0.377**	-0.051*	-0.115**	0.071**	-0.037	-0.109**	-0.033	-0.102**	-0.172**	-0.115**
		0.000	0.000	0.030	0.000	0.003	0.127	0.000	0.173	0.000	0.000	0.000
2		1	0.352**	-.0143**	-0.153**	0.108**	-0.060*	-0.115**	-0.041	-0.082**	-0.103**	-0.202**
			0.000	0.000	0.000	0.000	0.013	0.000	0.084	0.001	0.000	0.000
3			1	-0.094**	-0125**	0.062**	-0.030	-0.105**	-0.068**	-0.128**	-0.102**	-0.198**
				0.000	0.000	0.009	0.209	0.000	0.004	0.000	0.000	0.000
4				1	0.404**	-0.145**	0.321**	0.271**	0.251**	0.236**	0.209**	0.426**
					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5					1	-0.064**	0.136**	0.272**	0.076**	0.201**	0.272**	0.183**
						0.007	0.000	0.000	0.001	0.000	0.000	0.000
6						1	-0.101**	-0.083**	-0.071**	-0.067**	-0.074**	-0.089**
							0.000	0.001	0.003	0.005	0.002	0.000
7							1	0.435**	0.823**	0.339**	0.122**	0.256**
								0.000	0.000	0.000	0.000	0.000
8								1	0.344**	0.774**	0.367**	0.276**
									0.000	0.000	0.000	0.000
9									1	0.438**	0.093**	0.249**
										0.000	0.000	0.000
10										1	0.427**	0.327**
											0.000	0.000
11											1	0.239**
												0.000
12												1

1= Impulse Control Scale
2= Body Image Scale
3= Mastery of the External World Scale
4= Peer Disapproval Scale
5= Parental Disapproval Scale
6= Perceived Peer Behavior Scale
7= Alcohol-Related Risk Perception Scale
8= Illicit Drug-Related Risk Perception Scale
9= Alcohol-Related Risk Perception for Peers Scale
10= Illicit Drug-Related Risk Perception for Peers Scale
11= Perceived Risk vs. Benefits Scale
12= Characteristics of Peer Group Scale

p<.05*, p<0.01**

Discussion

The purpose of this study was to examine the factor structure and psychometric properties of data collected with the AHRBS instrument among Indiana middle and high school students enrolled in public and private schools. Scales consistent with the BPSM theoretical framework were included in the analyses (n = 68 items). Various statistical analyses were performed to assess the validity and reliability of data collected with the AHRBS instrument scales and to modify existing scales to create more precise and parsimonious scales to measure social constructs that influence behavior. Following factor analyses and psychometric testing, the original AHRBS instrument was reduced in length by 41.18%. Items were omitted from the original version of the instrument because of their limited contribution to scale reliability.

The measures retained in the modified instrument were acceptable in terms of internal consistency. There was suggestive evidence of construct validity for these data. Data collected with the AHRBS instrument demonstrated sufficient internal consistency reliability and measure stability among Indiana adolescents. Results of this study support that the final version of the AHRBS instrument is suitable for administration among adolescents in similar samples.

As a result of the initial EFA, a 15-factor solution was revealed, which included the 12 theorized scales included within the AHRBS instrument. After item elimination due to items double-loading or not loading strongly within any factor, a second EFA was performed that yielded a 10-factor solution. CFA for each of the 12 scales confirmed that items included in each factor measured the intended variable (Laukkanen et al., 2000).

Factor loadings from EFA and CFA suggest that the AHRBS instrument adequately measures theoretical dimensions of the BPSM.

Following CFA, items were deleted to produce the most parsimonious and reliable scales for the data. The psychometric testing reduced the number of included items by 14.89% after CFA. The reliability of 10 of the 12 scales was strengthened as a result of item deletion in Phases I through III. The Perceived Peer Behavior Scale was unchanged from Phase I to Phase III and the Illicit Drug-Related Risk Perception Scale was only slightly diminished (Cronbach's alpha reduced from 0.897 to 0.886, respectively). Most scales demonstrated a high degree of internal consistency reliability following psychometric testing-related item deletion, thus indicating that items within scales appear to have measured the same theoretical dimension. Further, Cronbach's alpha coefficients for all 12 scales remained stable across adolescent sub-demographic categories. These findings support that scales consistently measure intended concepts across subjects and do not vary in utility for any adolescent sub-demographic category.

Initial construct validity was established through factor analysis and confirmed by calculating Pearson's correlation coefficients between summed scale scores. Consistent with the instrument's theoretical framework, higher coefficients were found between dimension scales comprising larger theoretical constructs. These findings support the theoretical validity of the successively refined AHRBS instrument.

For the purpose of this paper, scales measuring theoretical dimensions of the BPSM were analyzed independently to preserve the intended structure on the AHRBS instrument; however, in future studies using this instrument, researchers may justify the

combination or elimination of theoretical dimensions. Decisions to analyze intended BPSM constructs with altered theoretical dimensions may enable researchers to tailor research efforts and explain adolescent health-endangering behavior using more precise and parsimonious models. The author recommends that psychometric properties be tested and reported and correlations be calculated for modified measures of theoretical dimensions to reconfirm the reliability and validity of the data collected.

Conclusion

Although considered a complex and multifaceted process, establishing the validity and reliability of data collected with survey instrument scales is paramount to the accuracy of study results (Patrick & Beery, 1991) and the advancement of health education research. The processes and results should, therefore, be shared within the research community in methodical detail through scholarly publication. Information regarding the process of testing data for validity and reliability is useful to other researchers and practitioners who wish to replicate studies, improve the quality of health education research, and generate more meaningful data to analyze.

Results of this study indicate that the AHRBS instrument may be a valuable tool, which may foster understanding of the psychological and socioecological aspects contributing to adolescent ATOD use. Although the AHRBS instrument displayed sound psychometric properties for the data in its final version of this study, researchers should reestablish the reliability and validity of the instrument and its scales in each subsequent administration (Chen, Sheu, & Chen, 2006). Replicating validation and reliability

procedures of this study for data collected in future administrations of the AHRBS instrument will allow researchers to evaluate the utility of the AHRBS instrument for their target population. Future studies using the AHRBS instrument may replicate and expand upon findings of this study. Such findings may be useful to other researchers searching for valid and reliable measures of socioecological, psychological, and behavioral factors among adolescents (Birnbaum et al., 2002) with regard to adolescent ATOD use.

Limitations

Despite relatively high estimates of internal consistency of data collected with the majority of scales, no other estimates of reliability are available for data collected with the refined AHRBS instrument scales. Although the results of the present study are encouraging, the data remain cross-sectional in nature; however, it is important to note that the measure's sensitivity to change has yet to be assessed or established for specific substances. Although this sample size was large, generalization of these conclusions to other populations must be further established. Nonetheless, the results of the present study provide good evidence of the stability of the AHRBS instrument for these data. Copies of the original and modified questionnaire may be obtained from the author.

CHAPTER IV

LIFETIME INHALANT USE AMONG INDIANA ADOLESCENTS: A MEDIATION ANALYSIS

Introduction

Adolescent Inhalant Use

Adolescent inhalant use has become increasingly recognized by health professionals and the general public as a health-endangering behavior (Baumann, Spitz, Predine, Choquet, & Chau, 2007; Edwards et al., 2007; Johnson et al., 2007; MacLean & D'abbs, 2006; McGarvey & Canterbury, 1996; Williams & Storck, 2007). Inhalants are substances such as gasoline, butane, spray paint, air freshener, nitrous oxide, glue, and shoe polish (Johnston, Bachman, & Schulenberg, 2007; McGarvey, Clavet, Mason, & Waite, 1999) that are inexpensive and commonly found within the home, making them widely accessible to adolescents (National Institute on Drug Abuse, 2006; Siqueria & Crandall, 2006). These substances are intentionally inhaled either through the nasal cavity (“sniffing” or “snorting”) or through the mouth (“huffing”) to produce desired effects. Health ramifications associated with adolescent inhalant use include the propensity to use other illicit substances (Bennett, Walters, Miller, & Woodall, 2000; McGarvey & Canterbury, 1996; Schutz, Chilcoat, & Anthony, 1994; Young, Longstaffe, & Tenenbein, 1999), poor academic achievement (Bennett et al., 2000; McGarvey & Canterbury, 1996; Oetting, Edwards, & Beauvais, 1988; Schutz et al., 1994; Yip,

Mashhood, & Naude, 2005), criminal behaviors (Fleschler, Tortolero, Baumler, Vernon, & Weller, 2002; Oetting et al., 1988; Schutz et al., 1994), and psychological distress (Dinwiddie, Reich, & Cloninger, 1990; Filley, Heaton, & Rosenberg, 1990; Fleschler et al., 2002; Oetting et al., 1988).

Although national trends in adolescent inhalant use have remained relatively unchanged over the past decade, the highest rates of inhalant use since 1997 were reported in 2004 (Johnson et al., 2007; Johnston et al., 2007). In 2007, national estimates of inhalant use among adolescents exceeded 13% (Centers for Disease Control and Prevention, 2008). Among new users of inhalants, approximately 78% were under the age of 18 years (Substance Abuse and Mental Health Services Administration, 2007). In 2006, lifetime rates of inhalant use among 6^{th}, 9^{th}, and 12^{th} grade students in Indiana were 6.5%, 11.4%, and 10.1%, respectively (Indiana Prevention Resource Center, 2006).

Perceived Disapproval and Peer Group Characteristics

Several researchers have attempted to explain relationships between adolescent substance use and contributing socioecological factors (Kubik, Lytle, Birnbaum, Murray, & Perry, 2003; Miller, 2002; Miller, Benson, & Galbraith, 2001; Petraitis, Flay, & Miller, 1995; Sutherland & Shepherd, 2001; Wu & Howard, 2007). Findings from previous research suggest that adolescents' perceptions of peer disapproval (Larimer & Cronce, 2007; Reis & Riley, 2000) and parental disapproval of substance use (Boyle & Boekeloo, 2006; Hampton, Jeffery, McWatters, & Smith, 2005; Sargent & Dalton, 2001) are protective factors for adolescent substance use. Relationships between characteristics

of the adolescent peer and adolescent substance use have been well documented (Barko & Eccles, 2003; Bernburg & Thorlindsson, 2001; Fan & Chen, 2001; Newcomb et al., 2002; Nuno-Gutierrez, Rodriguez-Cerda, & Alvarez-Nemegyei, 2006; Thorlindsson & Bernburg, 2004, 2006). Findings from such research suggest that adolescent peer groups may promote adolescents' engaging in extracurricular school activities or finding importance in academics (Barko & Eccles, 2003; Fan & Chen, 2001; Newcomb et al., 2002), or peer groups may promote adolescents' participating in delinquent behavior or the party culture (Bernburg & Thorlindsson, 2001; Thorlindsson & Bernburg, 2004, 2006).

Theoretical frameworks assist researchers to identify associations and relationships between adolescents' perceptions of peer/parental disapproval and characteristics of peer groups in relation to adolescent lifetime inhalant use. Adolescents are thought to self-select peer groups based on characteristics inherent to the adolescent (Nebbit, Lombe, & Lindsey, 2007). Adolescents' selection of peer groups may be an extension of parental relationships, values, and beliefs (Furman & Wehner, 1994; Miller et al., 2001; Oetting & Beauvais, 1986; Youniss, 1989). Despite a wealth of research surrounding associations between peer/parental disapproval of substance use and characteristics of the adolescent peer group, evidence supporting mediation relationships or mediation effects between these variables is limited (Miller et al., 2001).

The Biopsychosocial Model

Irwin and Millstein (1986) proposed the conceptual Biopsychosoical Model (BPSM), which remains among the most comprehensive of theoretical frameworks for conceptualizing and contextualizing the complexity of adolescent health risk behavior. This model describes the influence of biological maturation on psychological functioning and normative perceptions, which, through the mediation of risk perception and characteristics of the peer group may predict adolescent risk-taking behavior (Irwin & Millstein, 1992). This study focuses on the portion of the BPSM that hypothesizes the effects of adolescents' perceptions of their social environment on health-endangering behaviors are mediated by characteristics of adolescents' peer groups. Figure 1 is a modified illustration of the BPSM proposed by Irwin & Millstein (see Figure 1 in Chapter II).

Hypothesized Mediation

Mediation has been defined as "the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest" (Baron & Kenny, 1986). In other terms, a mediator variable is one that passes on the effect of an independent variable to a dependent variable. "A given variable may be said to function as a mediator to the extent that it accounts for the relation between the predictor and the criterion" (Baron & Kenny, 1986). In social science research, mediation is approached with the attached disclaimer to not imply causation (Kraemer, Wilson, Fairburn, & Agras, 2002; Sutherland & Shepherd, 2001). The complex and synergistic nature of

health and health behavior necessitate that researchers use caution when inferring causation. Establishing causality transcends the identification of mediator status between variables (Kraemer et al., 2002). Despite the inappropriateness of inferring causality by identifying mediating variables, exploring the relationships and interactions of variables as they relate to outcomes is essential to health education research and practice. After identifying a mediator variable, researchers must still inquire about "how" and "why" the independent and mediating variables interact to produce effects (E. Smith, 1982).

Primary Purpose of This Study

The primary purpose of this study is to examine the effects of adolescent perceptions of their social environment, such as perceived peer disapproval, perceived parental disapproval, and perceived peer behavior, on adolescent lifetime inhalant use in the presence of the theorized mediator variable, characteristics of the peer group.

Method

Sample

The Adolescent Health Risk Behavior Survey (AHRBS) instrument was administered to 1,992 middle and high school students in Indiana, randomly sampled from public and private, middle and high schools enrolled to participate in the 2006 Indiana Prevention Resource Center's *Alcohol, Tobacco, and Other Drug Use Survey* (Indiana Prevention Resource Center, 2006) instrument. The AHRBS instrument was

administered to students in their classrooms. Uniform instructions were provided to participants prior to completing the instrument. Participation in this study was voluntary and participants could withdraw at any time. Passive parental consent was obtained.

Instrumentation

The AHRBS instrument was developed in 2006 by E. Lisako J. McKyer. This instrument was a modification of an instrument originally designed by Mika Omori (Omori, 2001b) to explain and predict adolescent health-endangering behaviors among 808 Japanese college students (Omori, 2001a). The original instrument, developed by Dr. Omori, contained modified scales from instruments intended to measure psychological, socioecological, and behavioral contributors to adolescent health risk behaviors (Benthin, Slovic, & Severson, 1993; Chopak, 1993; Gibbons, Helweg-Larsen, & Gerrard, 1995; Indiana Prevention Resource Center, 1991; Offer, Ostrov, Howard, & Dolan, 1989, 1992). The Omori instrument was altered by McKyer to specifically investigate the relationships and influences of adolescent intrapersonal and normative perceptions on alcohol, tobacco, and other drug (ATOD) use of approximately 20 substances (Indiana Prevention Resource Center, 2006). The BPSM's latent constructs, "Cognitive Scope" and "Personal Values," were not measured.

In a preliminary study (Smith, 2008), the author assessed the construct validity, internal consistency reliability, and measures of stability for data collected with the AHRBS instrument. By using a combination of exploratory factor analyses, confirmatory factor analyses, and psychometric property testing procedures the AHRBS

instrument was reduced in length by 41.18% by systematically eliminating items due to their limited contribution to scale reliability to produce the Smith-Modified version of the AHRBS (SM-AHRBS) instrument. Measures retained in the SM-AHRBS instrument were yielded acceptable internal consistency reliability for these data. Validation and reliability testing methodology for data associated with the SM-AHRBS instrument are reported elsewhere (Smith, 2008).

The AHRBS instrument contains 190 close-ended, Likert-type, and multiple-choice items. The 190 items are organized to form 16 distinct scales intended to measure psychological and socioecological factors contributing to adolescent ATOD use. Of the 190 items included within the AHRBS instrument, a total of 16 SM-AHRBS instrument items (comprising 4 scales and the dependent variable) were included in this study.

Measures

Respondents' perceptions of the social environment were measured with three scales. Each scale measured a theorized dimension of the latent construct as postulated by the Biopsychosocial Model. Characteristics of the respondents' peer groups were measured with one scale. This scale was the only measure of this latent construct. In this study, peer disapproval, parent disapproval, and perceived peer behavior scores are initial variables (i.e., independent variables not theorized to be mediator variables). Characteristics of the peer group is the mediator variable and adolescent lifetime inhalant use is the outcome variable. Table 19 presents the means, standard deviations, reliability coefficients, and other descriptives for all measures used in this study.

Table 19. SM-AHRBS Instrument Scale Descriptives

AHRBS Instrument Scale	N of Items	n	Range	Mean	STD	Skewness	Skewness STE	Kurtosis	Kurtosis STE	Cronbach's α	Standardized α
Peer Disapproval Scale	5	1650	0-20	17.519	3.908	-1.896	0.060	3.372	0.120	0.905	0.910
Parental Disapproval Scale	2	1650	0-8	7.823	0.779	-6.343	0.060	49.366	0.120	0.745	0.749
Perceived Peer Behavior Scale	4	1650	0-20	8.933	3.896	-0.076	0.060	-0.249	0.120	0.843	0.846
Characteristics of Peer Group Scale	4	1650	0-16	12.708	2.494	-1.128	0.060	2.840	0.120	0.746	0.760
Lifetime Inhalant Use	1	1650	0-4	0.100	0.457	5.979	0.060	40.001	0.120	---	---

Peer Disapproval. Five items were used to measure the respondents' perceptions of how their peers would feel about them smoking cigarettes, smoking marijuana, consuming alcohol, and using illicit drugs. Likert-type response options for this scale ranged from 'strongly approve' (scored 0) to 'strongly disapprove' (scored 4). Responses for this scale were summed. Higher scores indicate higher perceived peer disapproval of health-endangering behavior.

Parent Disapproval. Two items were used to measure the respondents' perceptions of how their parents would feel about them smoking cigarettes and using illicit drugs. Likert-type response options for this scale ranged from 'strongly approve' (scored 0) to 'strongly disapprove' (scored 4). Responses for this scale were summed. Higher scores indicate higher perceived parent disapproval of health-endangering behavior.

Perceived Peer Behavior. Four items were used to measure the extent to which respondents' perceived that people their age engage in health-endangering behaviors. Respondents were asked to estimate the percent of their peers that are sexually active, smoke cigarettes, consume alcohol, and use illicit drugs. These items had 5 response options: '0% (scored 0), '20%' (scored 1), '40%' (scored 2), '60%' (scored 3), '80%' (scored 4), and '100%' (scored 5). Responses for this scale were summed. Lower scores indicate respondents perceived fewer peers are engaged in health-endangering behavior.

Characteristics of the Peer Group. Four items were used to measure the extent to which respondents' agreed or disagreed that their friends are interested in school, attend

class regularly, think getting good grades is important, and plan to go to college. Likert-type response options for this scale ranged from ‘strongly disagree’ (scored 0) to ‘strongly agree’ (scored 4). Responses for this scale were summed. Higher scores indicate respondents perceived their peer group more positively.

Dependent Variable. One item was used to measure the respondents’ reported lifetime inhalant use. This item had 5 response options: ‘never’ (scored 0), ‘1-5 times’ (scored 1), ‘6-19 times’ (scored 2), ‘20-40 times’ (scored 3), and ‘more than 40 times’ (scored 4).

Mediation Analysis Procedures

The Baron and Kenny three-step approach was employed to test whether characteristics of the peer group would mediate the effects of perceptions of the social environment on adolescent lifetime inhalant use (Baron & Kenny, 1986; Judd & Kenny, 1981). The author used a series of ordinary least squares (OLS) regressions to model the association between initial, mediating, and outcome variables using SPSS v 16.0. In step 1, the mediator variable (i.e., characteristics of the peer group) was regressed on the initial variable (i.e., perceptions of the social environment). In step 2, the outcome variable (i.e., lifetime inhalant use) was regressed on the initial variable. In step 3, the outcome variable was regressed on both the initial and mediating variable. The following conditions are requisite to establish mediation: (1) the initial variable must be correlated with the mediating variable in step 1; (2) the initial variable must be correlated with the outcome variable in step 2; (3) the mediating variable must be correlated with the

outcome variable in step 3; and (4) the effect of the initial variable on the outcome variable must decrease from step 2 to step 3 (Baron & Kenny, 1986; Judd & Kenny, 1981). Figure 2 is an illustration of a general mediation model.

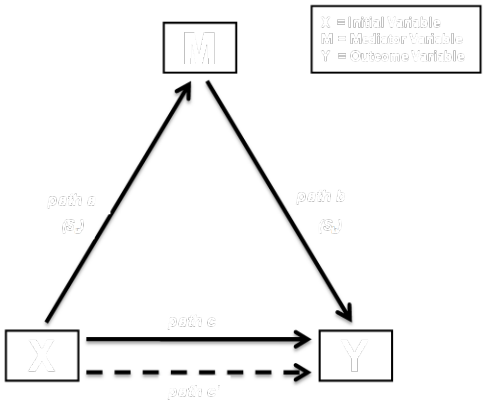

Figure 2. General mediation model

The author followed standard procedures for testing mediating relationships, which involve examining correlations between initial and mediating variables and change in unstandardized OLS regression coefficients (Baron & Kenny, 1986). To examine the significance of the mediating effect, the author performed a Sobel's test and Aroian's test (Aroian, 1944; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002;

Sobel, 1982). Both tests calculate the critical ratio to investigate the indirect effect of the initial variable on the outcome variable through a proposed mediator (i.e., reduction of the initial variable effect on the outcome variable with and without controlling for the mediator variable; Sobel, 1982). The tests calculate whether the indirect effect is significantly different from zero (MacKinnon et al., 2002; Preacher & Leonardelli, 2001). Although Sobel's test is most commonly used, it has been criticized for being exceptionally conservative because it omits the product of regression coefficient standard errors for step 1 and step 2 (Baron & Kenny, 1986; MacKinnon, Warsi, & Dwyer, 1995). The author calculated both test statistics for heuristic purposes. Sobel's and Aroian's test statistics are analogous to a z-score (MacKinnon et al., 2002). Finally, the author calculated proportions between unmediated and mediated regression effects to determine the percent of the regression effect being mediated (Kenny, Kashy, & Bolger, 1998).

Aforementioned procedures were replicated three times to independently test for mediating relationships between characteristics of the peer group on peer disapproval, parental disapproval, and perceived peer behavior. Calculations for all statistics performed during the mediation analysis are presented in Table 20. To control for experiment-wise Type I error, regression analyses were conservatively conducted with $\alpha = .001$ (MacKinnon et al., 2002).

Table 20. Equations & Values Required for Mediation Analyses

Value / Test	Description / Equation
a	unstandardized regression coefficient in path a
S_a	standard error associated with regression coefficient in path a
b	unstandardized regression coefficient in path b
S_b	standard error associated with regression coefficient in path b
c	unstandardized regression coefficient in path c
Sobel's Test	$(a*b)/\sqrt{((b^2*s_a^2) + (a^2*s_b^2))}$
Aroian version of Sobel's Test	$(a*b)/\sqrt{((b^2*s_a^2) + (a^2*s_b^2) + (s_a^2*s_b^2))}$
Indirect Effect	a*b
Proportion of Effect Mediated	1 - ((a*b)/c))

Results

Patterns of missing data were analyzed and determined to be missing at random. Listwise deletion was employed for the variables of interest. The final sample for this study was 1,650 students.

Table 21 presents the unstandardized regression coefficients, associated standard errors, and adjusted coefficients of determination (adjusted R^2) for OLS regressions performed during mediation analyses. Total effects of OLS regression analyses indicate that adolescents with lower rates of lifetime inhalant use perceived their peers to disapprove of substance use (b=-.033, p<.001), perceived their parents to disapprove of substance use (b=-.113, p<.001), and perceived their peers to use drugs (b=.014, p<.001). Figure 3 represents the mediation model for this study and contains the results of mediation tests. Path *a* is the effect of adolescent perceptions of the social environment on characteristics of the peer group. Path *b* is the effect of characteristics of the peer group on adolescent lifetime inhalant use. Path *c* is the total effect (i.e., unmediated) of adolescent perceptions of the social environment on adolescent lifetime

inhalant use. Path *c'* is the direct effect (i.e., mediated) of adolescent perceptions of the social environment on adolescent lifetime inhalant use.

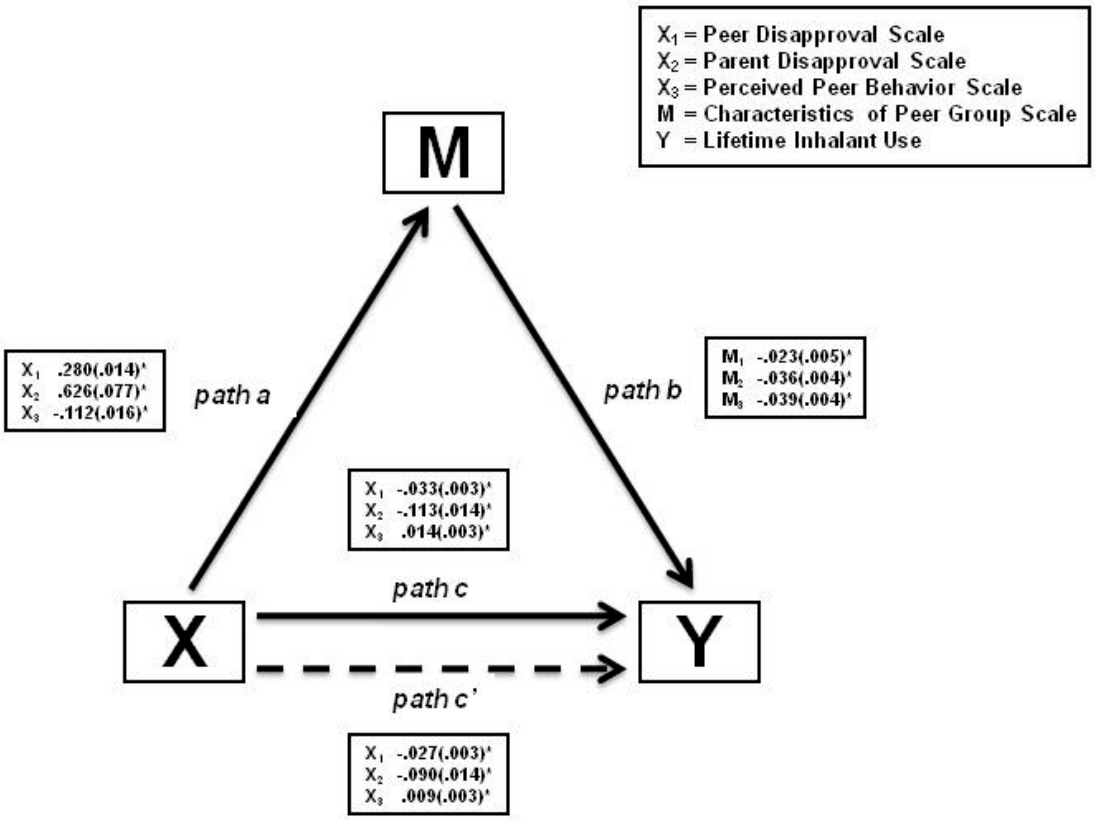

Figure 3. Mediation model for the present study

Table 21. OLS Regression Tests for Mediator Variables (n = 1605)

	Step 1			Step 2			Step 3		
Dimension	**(Initial → Mediator)**			**(Initial → Outcome)**			**(Initial → Outcome: mediator controlled)**		
Peer Disapproval	.280(.014)*			-.033(.003)*			-.027(.003)*		
Parental Disapproval		.626(.077)*			-.113(.014)*			-.090(.014)*	
Perceived Peer Behavior			-.112(.016)*			.014(.003)*			.009(.003)*
Characteristics of Peer Group							-.023(.005)*	-.036(.004)*	-.039(.004)*
Adjusted R^2	0.193	0.038	0.030	0.081	0.036	0.013	0.094	0.073	0.057

*p<0.001
Note: Unstandardized regression coefficients and standard errors (in parentheses) reported

OLS Regression Analyses

All regression analyses conducted during the mediation analysis met requisite conditions to establish partial mediation (Baron & Kenny, 1986; Judd & Kenny, 1981). Effects of the perceptions of the social environment dimensions on characteristics of the peer group were significant (path *a*). Direct effects of these dimensions on adolescent lifetime inhalant use were also significant (path *c*). Mediation tests yielding total effects of these dimensions on adolescent lifetime inhalant use (path *c'*) and the effect of characteristics of the peer group on adolescent lifetime inhalant use (path *b*) were significant. The indirect effects for peer disapproval, parental disapproval and perceived peer behavior were -.006, -.023, and -.001, respectively.

Sobel and Aroian Test Statistics

Table 22 presents results from significance tests for mediating effects. Test statistics for Sobel's test and Aroian's test yielded similar results. Sobel's test statistics for peer disapproval, parental disapproval, and perceived peer behavior were -4.48 ($p<.001$), -6.03 ($p<.001$), and -5.69 ($p<.001$), respectively. Aroian's test statistics for peer disapproval, parental disapproval, and perceived peer behavior were -4.48, -6.01, and -5.67, respectively. Effects from the differences when calculating these test statistics were not seen for these data. The significance for these test statistics at the $p<.001$ level indicate that the attenuation between the unmediated and mediated effects for peer disapproval, parental disapproval, and perceived peer behavior were statistically different from zero.

Table 22. Significance Tests for Mediating Effects

Dimension	Indirect Effect	Sobel Test	Aroian Test	Proportion of Effect Mediated
Peer Disapproval	-0.006	-4.483*	-4.478*	0.805
Parental Disapproval	-0.023	-6.033*	-6.013*	0.801
Perceived Peer Behavior	-0.001	-5.686*	-5.667*	1.312[«]

*p<0.001

[«]Note: Proportion values ≥ 1 indicate inconsistent mediation

Correlations

Table 23 shows correlations between initial and mediating variables presented in this study. Variables in all postulated mediating relationships are correlated via path *a* (Baron & Kenny, 1986). Attenuated effects in path *c'* in mediating relationships are influenced by correlations between initial and moderating variables (Baron & Kenny, 1986). In other words, when adolescent lifetime inhalant use is regressed on peer disapproval and characteristics of the peer group, the attenuation in the regression coefficient originates from both independent variables explaining some amount of common variance in the outcome variable (i.e., multicollinearity). Multicollinearity was examined in all OLS regression models using tolerance collinearity statistic tests. No evidence of problematic multicollinearity existed between any variables of interest (tolerance statistics ranged from .81 to .97). The correlation; however, between perceived peer behavior scores and characteristics of the peer group scores was almost 47% and may have biased the precision of associated regression effects (Baron & Kenny, 1986; MacKinnon et al., 2002).

Table 23. SM-AHRBS Instrument Scale Correlations

	1	2	3	4
1	1	0.380**	-0.300**	-0.134**
		0.000	0.000	0.000
2		1	-0.119*	-0.049*
			0.000	0.047
3			1	-0.467**
				0.000
4				1

1= Peer Disapproval Scale
2= Parental Disapproval Scale
3= Perceived Peer Behavior Scale
4= Characteristics of Peer Group Scale

p<0.05*; p<0.01**

Proportion of Mediation

Proportions of total effects and direct effects were calculated and reported in Table 22. These proportions of unmediated and mediated initial variable effects on adolescent lifetime inhalant use are valuable to support theorized mediation relationships (Kenny et al., 1998). Calculated proportions may be unstable when regression coefficients for path *c* are small (Kenny et al., 1998). In this study, small regression coefficients for path *c* may be responsible for the inconsistent mediation for the perceived peer behavior total effect (Kenny et al., 1998). For this calculation, inconsistent mediation is characterized by proportions greater than 1. Inconsistent mediation for the perceived peer behavior total effect may be attributed to the multicollinearity between this initial variable and the mediation variable (47%; i.e., these variables explaining common variance in the outcome variable). The percent of the peer disapproval total effect on adolescent lifetime inhalant use being mediated by

characteristics of the peer group was 81%. Eighty percent of the parental disapproval total effect on adolescent lifetime inhalant use is mediated by characteristics of the peer group.

Discussion

Researchers have recommended investigating adolescent substance use from a holistic biopsychosocial approach (Sutherland & Shepherd, 2001; Wallace, 1993). In the present study, mediation analyses were performed to identify theoretical mediation effects of characteristics of the adolescent peer group on adolescent perceptions of the social environment in regard to adolescent lifetime inhalant use. Theoretical justification is necessary for exploring plausible mediating relationships associated with adolescent inhalant use and the possible implications of such relationships (Kraemer et al., 2002). Guided by the BPSM theoretical framework, the author investigated theorized mediating relationships.

Analyses confirmed that regression coefficients of peer disapproval, parental disapproval, and perceived peer behavior were attenuated in the presence of the mediator variable, characteristics of the peer group. Total and direct effects of peer disapproval, parental disapproval, and perceived peer behavior on adolescent lifetime inhalant use were statistically significant. Combined initial variable and mediating variable effects for peer disapproval, parental disapproval, and perceived peer behavior explained 9.4%, 7.3%, and 5.7% of the variance in adolescent lifetime inhalant use, respectively. These

relatively small effect sizes suggest that other factors contribute to adolescent lifetime inhalant use; however, these variables were not included in this study.

Despite strong correlations between initial variables and the mediating variable (and attenuated effects of the initial variables on the outcome variable in the presence of the mediating variable), each initial variable accounted for unique sources of variance in the outcome variable (i.e., partial mediation). Although initial variable effects were partially mediated, causation is not implied. The effects seen for this sample may accurately portray relationships among some, but not for all, participants. The interrelatedness of perceptions of peer behavior, perceptions of peer disapproval of substance use, and characteristics of the adolescent peer group make it difficult to chronologically order these variables. Findings from the present study reveal strong associations between examined variables (Sutherland & Shepherd, 2001). Mediating effects and variable interactions found in this study should be replicated and further explored for other substances and samples to determine the consistency of these effects.

The present study provides a foundation of evidence for mediating relationships associated with adolescent inhalant use. Future research should investigate other theoretical mediating relationships included in the BPSM. Variable relationships should be viewed and interpreted in social context and considered to exist with other mediator, moderator, and confounding variables. Findings from the present study support that peer disapproval, parental disapproval, perceived peer behavior, and characteristics of the adolescent peer group should be included together in future research study designs and analyses regarding adolescent health-endangering behaviors.

Limitations

There were limitations associated with the present study. First, these data were cross-sectional. The complex and synergistic relationships between adolescent perceptions of their social environment, characteristics of adolescent peer groups, and adolescent lifetime inhalant use are not fully captured with cross-sectional data. Second, only a portion of the BPSM was investigated during the present study. Mediation analyses were performed in isolation without considering other variables. Factors contributing to adolescent lifetime inhalant use are not static or independent. To gain a more complete understanding of the complex web of factors contributing to adolescent lifetime inhalant use, a more holistic, systemic, and synergistic set of statistical analyses should be performed. Statistical methods performed in the present study do not allow for more complex investigations that simultaneously consider systems of theoretical relationships (Ahmed & Mosely, 2002; Bollen, 1989; Duncan, 1975; MacKinnon, Fairchild, & Fritz, 2007). Finally, measurement errors were associated with instrument measures intended to tap the overall latent BPSM constructs (Stephensen, Holbert, & Zimmerman, 2006). Measurement error may occur when participants' responses are influenced by a lengthy survey instrument or poor instrument construction (Dillman, 2007). Despite extensive post hoc validity and reliability testing of the data collected with the AHRBS instrument, measurement error inevitably influenced correlations between variables (Dillman, 2007).

CHAPTER V

SUMMARY AND CONCLUSIONS

Introduction Restatement

As a field of study, the advancement of health education is reliant upon diligent and methodical research practices and statistical analyses. The increasing trend of published articles in health education journals using survey research reinforces the demand for sophisticated techniques to design survey instruments and evaluate data collected with survey instruments for validity and reliability. Performing these statistical analyses on data collected with survey instruments benefits health education in two major ways. First, when frequently and consistently reported in the published literature, these complex statistical methods may enable researchers to locate useful survey instruments to be used in future research and assess the feasibility and efficacy of replicating study procedures and results. Second, when researchers perform psychometric tests on data collected with survey instruments, the resulting measures, when used in statistical and theoretical models, are more accurate and findings are less likely to be interpreted erroneously.

Problems are associated with increasing trends in unique quantitative research-based publications. First, a lack of evidence exists in the literature to support that survey instruments are created properly. Second, a lack of evidence exists to support that survey instruments are consistently evaluated for validity and reliability for the data. Third, a lack of sufficiently detailed documentation exists to enable other researchers to

assess the level of rigor taken by the authors, determine a study's relevancy to personal practice, and assess the feasibility and efficacy to replicate study methodologies.

Despite the complexity and time-intensive methods of statistically analyzing the validity and reliability of data collected with survey instruments, these procedures are essential to create and share instruments and scales of high quality and precision. Without performing psychometric testing to examine the validity and reliability of data collected with survey instruments, the parsimony of the survey instrument and the accuracy of the calculated results may be diminished. After measures have been deemed valid and reliable for the data, they may be appropriately used for theory testing. Precise and parsimonious measures may more efficiently and accurately enable researchers to examine the theorized relationships between constructs and measured construct dimensions. Further, repeat administration of survey instruments and repeated psychometric property testing of collected data has implications for establishing measures as reliable for data in multiple samples, generalizing study findings beyond samples in which data were collected, and setting the standard for best practice in health education research.

This dissertation is an attempt to identify "gaps" in current health education publishing practice, provide detailed descriptions of validity and reliability testing methods for data collected with survey instruments, and use parsimonious measures with maximum reliability to analyze data and interpret findings. Combined, the purposes of this dissertation include the following: (1) emphasize the importance of testing psychometric properties associated with survey instruments; (2) provide strategies to

minimize research bias and error from research findings due to inappropriately using unreliable measures; and (3) provide recommendations for best practice for performing reliability analyses, documenting analysis procedures, and including instrument descriptives and psychometric property test results in published health education literature.

Chapter Summaries

Chapter II

Health education research influences health education practice. As such, published health education literature partially guides the direction of the field of study. A review of health education literature revealed a growing trend in published articles based on quantitative research study designs (Merrill et al, 2007). Calls for unique and sophisticated health education research by leaders in the field (Glover, 2004; McDermott, 2000; Torabi, 2004) may be responsible for the surge in survey research-based publications.

Unfortunately in health education there are no thermometers to measure human knowledge, perceptions, attitudes, or beliefs. For this reason, advancements in health education have been partially attributed to the development of valid and reliable techniques to measure social variables (Ary, Jacobs, & Razaveih, 1996). One method of collecting data from community members is through survey instruments. Survey instruments are commonly incorporated into health education research designs. The

frequent use of survey research stresses the importance for well-constructed survey instruments and detailed documentation of survey methodology in published literature.

The validity and reliability of a survey instrument for the data is critical to research findings (Patrick & Beery, 1991). Unreliable survey instruments may compromise data integrity, impose bias, and yield unreliable and invalid results (O'Rourke, 2001). Psychometric testing should be used to determine the value of survey instruments. These processes are complex and time-intensive but necessary. Providing evidence of validity and reliability for data collected with a survey instrument is beneficial to the investigators of the study and, if documented in detail within the published literature, the research community. Publishing descriptions of survey instruments used, survey research methodology, and results from psychometric testing provides a baseline for replicability and future generalizability while enabling researchers to assess the feasibility and efficacy of replicating the study methods.

The aim of Chapter II was to identify the use of survey instruments and associated psychometric property reporting in currently published health education literature. An analysis of the content related to the use of survey instruments and associated psychometric property reporting was performed using articles published in four health education journals: all 2006 and 2007 issues of *Health Education and Behavior*, *Health Education Journal*, *Health Education Research*, and *International Electronic Journal of Health Education*. Inclusion criteria limited selected articles to those containing primary or secondary data collected using a survey instrument. A total

of 403 articles were examined for potential inclusion. After applying inclusion criteria, 203 articles formed the final sample and were analyzed with a 26-point content rubric.

Of the articles meeting predetermined inclusion criteria, 76.3% used quantitative research methodology, 18.7% used mixed-methods methodology, and 4.9% were secondary data analyses. Over 61% of these articles employed a cross-sectional research design and 83.3% reported that instruments used to collect data were either created by the authors of the article, modified versions of existing instruments, or a combination of existing scales to comprise one instrument. Almost 60% of included articles did not report psychometric properties associated with the instrument used to collect data. Of the 40% of articles reporting psychometric properties associated with the instrument used to collect data, 89.3% reported Cronbach's alpha reliability coefficients. Only 11.8% of articles that used an existing instrument in their study reported psychometric properties associated with a previous administration of that instrument while only 2.5% of published articles meeting inclusion criteria included a version of the instrument or scale used in the reported study.

Chapter III

Adolescent alcohol, tobacco, and other drug (ATOD) use is widely recognized as a contemporary health issue in the United States. Valid and reliable assessments are needed to accurately measure the extent of ATOD prevalence and incidence rates and the influence of psychological and socioecological contributing factors. Testing the validity and reliability of data collected with survey instruments enables researchers to

measure social phenomenon with consistent measures across demographic samples (Laukkanen, Halonen, Aivio, Viinamaki, & Lehtonen, 2000). Survey instruments that have undergone rigorous validity and reliability testing for collected data are valuable tools for the research community. A validated survey instrument, with repeated administration, may substantially contribute to the understanding of social variables and relationships between variables, which are theorized to be associated with adolescent ATOD use.

The purpose of Chapter III was to explore the validity and reliability of data collected with the Adolescent Health Risk Behavior Survey (AHRBS) instrument. The AHRBS instrument was created in 2006 by Dr. E. Lisako J. McKyer and is a modified version of an instrument created in 2001 by Dr. Mika Omori. The AHRBS instrument contains items intended to measure latent constructs of the Biopsychosocial Model (BPSM). This model depicts the influence of biological maturation on psychological functioning, which through the mediation of risk perception and characteristics of the peer group may explain and predict adolescent risk-taking behavior (Irwin & Millstein, 1992).

Data were collected from 1,992 middle and high school students enrolled in public and private schools in Indiana. Of the 190 items included within the AHRBS instrument, 68 were included in this study. Included items were chosen because they were contained within a scale and were intended to measure a latent construct of the BPSM. All other items were omitted. Items were reverse-coded as necessary.

Validity and reliability tests were performed on data collected with the AHRBS instrument. Specifically, exploratory factor analyses, confirmatory factor analyses, internal consistency reliability tests, and measures of data stability were performed. Items were systematically eliminated for their limited contribution to scale reliability. Results from these analyses reduced the number of AHRBS instrument items by 41.18%. Exploratory factor analyses identified a 10-factor solution with an explained variance of 61%. The Kaisor-Meyer-Olkin measure of sampling adequacy gave a value of 0.859 and a significant Bartlett test of sphericity (X^2=47356.386, df=1801, P=0.000). A series of 12 confirmatory factor analyses were performed on the remaining 47 items. Items were analyzed based on their factor loadings and their theorized BPSM construct dimensions. All 1-factor solutions were confirmed. Items were then systematically eliminated until maximum Cronbach's alpha coefficients were achieved. An additional 7 items were eliminated. Alpha coefficients for the 12 scales (i.e., 40 items) ranged from 0.637 to 0.950. Cronbach's alpha coefficients were then calculated for all finalized scales across 10 adolescent sub-demographics as measures of stability. Construct validity was confirmed by calculating correlations between scale item-totals.

Chapter IV

Adolescent inhalant use is widely recognized as a health-endangering behavior. In 2006, lifetime rates of inhalant use among 6th, 9th, and 12th grade students in Indiana were 6.5%, 11.4%, and 10.1%, respectively. A wealth of research has investigated adolescent substance use and socioecological factors associated with adolescent

substance use. Most of these studies report descriptive findings and correlations between variables, but do not address theoretical mediating relationships (Miller, 2001).

The BPSM depicts the influence of biological maturation on psychological functioning, which through the mediation of risk perception and characteristics of the peer group may explain and predict adolescent risk-taking behavior (Irwin & Millstein, 1992). This study focused on the portion of the BPSM that hypothesizes that the effects of adolescents' perceptions of their social environment on health-endangering behaviors are mediated by characteristics of adolescents' peer groups. The purpose of this study was to examine the effects of adolescent perceptions of their social environment (i.e., perceived peer disapproval, perceived parental disapproval, and perceived peer behavior) on adolescent lifetime inhalant use in the presence of the theorized mediator variable, characteristics of the peer group.

Using the Smith-Modified Adolescent Health Risk Behavior Survey (SM-AHRBS) instrument generated for the manuscript in Chapter III of this dissertation, mediation analyses were performed using the Barron and Kenny three-step approach (1986). A series of ordinary least squares (OLS) regressions were performed to model the associations between initial, mediating, and outcome variables. Results of OLS regressions were then tested using Sobel's test (1982) and Aroian's version of Sobel's test (1944) to examine the significance of mediating effects. Correlations were then examined for multicollinearity between initial variables and the mediating variable. Proportions between unmediated and mediated regression effects were then calculated to determine the percent of the regression effect being mediated (Kenny, Kashy, & Bolger,

1998). These procedures were performed three times to independently examine mediation effects of this portion of the BPSM.

Mediation analyses confirmed the existence of theoretical mediation effects of characteristics of the adolescent peer group on adolescent perceptions of the social environment with regard to adolescent lifetime inhalant use. Total effects of OLS regression analyses indicate that adolescents with lower rates of lifetime inhalant use were more likely to perceive peer disapproval of substance use ($b=-.033$, $p<.001$), more likely to perceive parental disapproval of substance use ($b=-.113$, $p<.001$), and less likely to perceive that their peers are using drugs ($b=.014$, $p<.001$). The indirect effects for peer disapproval, parental disapproval and perceived peer behavior were -.006, -.023, and -.001, respectively. Sobel's test statistics for peer disapproval, parental disapproval, and perceived peer behavior were -4.48, -6.03, and -5.69, respectively. Aorian's test statistics for peer disapproval, parental disapproval, and perceived peer behavior were -4.48, -6.01, and -5.67, respectively. The percent of the peer disapproval and parental disapproval total effects on adolescent lifetime inhalant use mediated by characteristics of the peer group was 81% and 80%, respectively. It is important to note that the identification of mediation relationships in this study do not imply causation.

Discussion of Relevance to Overall Dissertation

Chapter II

Findings from Chapter II show that the majority of articles published in 2006 and 2007 within these journals used cross-sectional, quantitative research designs. These findings also revealed that survey instrument characteristics and psychometrics associated with the survey instruments used to collect data were reported infrequently and inconsistently. Published health education literature assists to establish health education as a credible, respected, and authoritative field of study.

The content published in health education literature should explicitly outline research methods and procedures performed during the data collection and data analysis. Researchers rely on published literature to determine the status of existing knowledge on a particular topic of interest. Published literature is additionally used to justify and support new and unique research endeavors. At a glance, health education journal readers should be able to identify procedures taken to yield study results and assess the feasibility and efficacy of reproducing those study results. Content included within published health education manuscripts should be thorough and detailed to enable and assist journal readers to follow study methods like recipes in a cookbook.

Performing critical analyses of the health education literature allows health education researchers and practitioners to identify strengths and weaknesses in the profession. By systematically reviewing articles for content, health education researchers and practitioners may be able to follow trends in research addressing health-

related issues, document successful methods of influencing health behavior, and identify research-based gaps and demands. Once trends, successes, and gaps are identified, health education researchers may reactively tailor research efforts to expand the existing body of knowledge and advance the discipline. Critically evaluating the health education literature allows health education researchers and practitioners to see what is being executed well and locate areas for improvement.

Analyzing the content in published health education literature informs health education researchers and practitioners about the studies and practices of others in the field. Health education researchers should be familiar with the literature to promote unity and solidarity in the profession. The field of health education will continue to advance as long as the "left hand" knows what the "right hand" is doing. A knowledgeable and well-read health education researcher is a resource and asset to the profession. These health educators may use their familiarity of the literature to complement and build upon the research agendas of others.

The analysis of the literature performed in this chapter was specifically aimed at evaluating survey instrument characteristics and associated psychometric property reporting practices in published health education literature. Although the published articles in this sample were infrequent and inconsistent, it is not fair to speculate as to whether or not researchers are appropriately testing the validity and reliability of data collected with survey instruments. Regardless of researchers' data analytic practices, few articles published survey instrument characteristics or psychometric properties for data collected with survey instruments in this sample.

Limited publishing of survey instrument characteristics and psychometric properties for data collected with survey instruments has potential to impede advancements in health education research. The absence of reporting these critical components hinders other researchers from replicating the process in future research. If there is no reporting of instrument-related information, there is no baseline for comparing or replicating study results. Only through replicating research methods and yielding similar results may we begin to generalize findings beyond the sample in which the data were collected. This void makes it difficult to determine the rigor of the research methods, quality of subsequent research findings, or feasibility of replicating study methodology.

Chapter III

Health education researchers commonly use cross-sectional, quantitative research designs. The frequent use of survey instruments to collect primary data from study participants emphasizes the importance of carefully constructing survey instruments and testing the validity and reliability of data collected with these instruments. Unfortunately, reporting survey instrument characteristics and psychometric properties of data collected with survey instruments is infrequent and inconsistent. As previously mentioned, it is unfair to assume that the absence of this information in the published health education literature indicates that health education researchers are not performing tests of validity or reliability for data collected with survey instruments. Because

psychometric property test results were rarely reported in these published articles, there is, however, no guarantee that health education researchers were performing psychometric property tests. This chapter provided justification for testing data for reliability and detailed descriptions of validity and reliability testing phases. Secondary purposes of this chapter were to raise awareness about the importance of psychometric property testing and demystify the process by providing a step-by-step narrative of procedures performed.

The implications of using unreliable measures in data analyses transcend any one particular study. Using unreliable measures in data analyses may bias or distort study results and cause researchers to make erroneous interpretations of study findings. In addition to reducing research bias, performing psychometric tests to assess the validity and reliability of data may reduce measurement error, yield measures that more accurately measure intended theoretical constructs, and reduce the length of survey instruments through systematic item deletion (Dillman, 2007). A more parsimonious survey instrument may increase participant response and completion rates (Dillman, 2007).

The process of testing data collected with survey instruments for validity and reliability is complex and labor-intensive (Chen et al., 2003). An array of procedures exists to determine the extent to which instrument scales are valid and reliable for the data. Health education researchers are encouraged to select a series of testing procedures most appropriate for their data. In this article, validity and reliability tests were purposively chosen to explore the factor structure and scale reliability for the data

collected with the AHRBS. Although these methods may not be appropriate for all studies, they are appropriate for many survey research study designs. These, or a variation of these, procedures should be followed for all data collected with survey instruments, after each survey administration, and for every sample. To use an analogy, performing psychometric property tests to assess the validity and reliability of data collected with survey instruments is like properly using condoms to prevent pregnancy and sexually transmitted infections. Just as condoms should be used correctly and consistently during each and every sexual encounter, psychometric property testing should be performed methodically and persistently after each and every administration of a survey instrument.

Following the four phases outlined in this article, the SM-AHRBS instrument was created. As a result of psychometric property testing, the SM-AHRBS instrument is 41.18% shorter than the AHRBS instrument, and the internal consistency reliability for included scales are stronger for the data. Because they are more reliable for the data, the SM-AHRBS instrument scales are preferred over the AHRBS instrument scales for inclusion in data analyses performed to explore relationships between BPSM construct dimensions. These procedures and findings are intended to be shared among the research community to provide an example of best practice methodology and provide researchers with baseline measures in which to replicate. The SM-AHRBS instrument is available for use by other researchers (contact the author).

If conducted properly, and uniformly reported in published health education literature, psychometric property testing of data collected with survey instruments may

enable researchers to follow statistical analyses performed and replicate study findings. After repeated administration of survey instruments and validity and reliability testing for the data, research findings may eventually be generalized beyond the samples in which data were collected. Consistent findings across studies using the same survey instrument may indicate that the instrument is a valuable tool for measuring theoretical constructs and construct dimensions. Research findings that are replicated may advance the health education profession and stimulate original and unique research.

Chapter IV

Analyses performed in Chapter IV included SM-AHRBS instrument scales. Mediation analyses were performed to examine relationships proposed by the BPSM (i.e., the theoretical framework in which the AHRBS was created). Findings of this study supported that characteristics of the adolescent peer group mediate the effects of perceptions of the social environment (i.e., perceived peer disapproval, perceived parental disapproval, and perceived peer behavior) on adolescent lifetime inhalant use. Limited research exists about these theoretically mediated relationships; therefore, the results from this study fill a void in the health education literature. Although initial variable effects were found to be partially mediated, causation is not implied.

The series of ordinary least squares (OLS) regression analyses performed in this study were intended to incrementally identify relationships between initial, mediating, and outcome variables. Incremental testing of theorized mediating relationships has provided the author with a basic understanding of the interactions among variables in

this portion of the BPSM. After publishing results identified in this study, other researchers may choose to use the SM-AHRBS instrument to replicate study methods and confirm study findings. Reproducing these mediating relationships in other samples will provide stronger evidence to support theorized relationships between latent constructs in the BPSM. Only scales determined to be reliable for the data should be used to test theoretical relationships between variables. Using untested measures to test these relationships is more likely to yield inaccurate findings and lead to erroneous interpretations of study results.

When compared to the AHRBS instrument, the SM-AHRBS instrument measures were more parsimonious and more acceptable for the data in terms of internal consistency. Using the SM-AHRBS instrument scales to perform statistical analyses to explore relationships between BPSM construct dimensions was more appropriate than using the original AHRBS instrument scales. Findings of this study are hypothesized to be more accurate and precise than findings that would have been produced using unaltered AHRBS instrument scales for these data.

The BPSM is among the most comprehensive theoretical frameworks extant intended to measure biological maturation and psychological and socioecological factors influencing adolescent health-endangering behavior. Some may claim that the BPSM is too complex and overwhelming to be included in a research study or measured with a survey instrument; however, it is important to note that factors contributing to health and human behavior are also complex and overwhelming in nature. The systematic creation of the SM-AHRBS instrument for this study is evidence that parsimonious instrument

scales that are reliable for the data can be used to explain relationships between BPSM construct dimensions.

Methodological and Conceptual Concerns

A limitation of the current study was related to the sampling. Data were collected from a sample of middle and high school students enrolled in public or private schools in Indiana. This sample may not be representative of all adolescents residing in Indiana or in other states. Findings from this study should not be generalized beyond this sample.

Another limitation of the current study was related to self-reported data collected in a cross-sectional research design. Self-reported data may be subject to unreliable responses from survey participants. Participants may exaggerate or under-report responses to survey instrument items. These potential distortions of participants' true responses may be associated with social desirability bias. Because participants were asked to estimate the number of times they used inhalants over their lifetime, the past year, and the past month, participants' responses may be subject to recollection bias. Data from cross-sectional designs only yield information pertaining to that exact moment of time; therefore, cause and effect relationships cannot be concluded or implied.

A delimitation of the current study was related to the skewness and kurtosis of these data. Data collected with Likert-type scales in social science research are prone to be skewed in the direction toward socially desired responses. Data for many AHRBS instrument scales were negatively skewed, which indicates that data were asymmetrical

and not normally distributed. The perceived peer behavior scale presented a leptokurtic data distribution, which indicates that there was less variance in the distribution. Future analyses of these data may employ data transformation techniques for non-normally distributed data, such as the Mosteller and Tukey transformation (Hoaglin, Mosteller, & Tukey, 1983; Mosteller & Tukey, 1977).

A conceptual concern pertains to the mediation analyses performed in Chapter IV. During each mediation analysis only one initial variable was analyzed. This means that the relationships between each initial, mediator, and outcome variable were examined and interpreted in isolation. Although examining mediated relationships in isolation is essential to preliminary theory testing, these relationships are not representative of true behavior. The theorized construct dimension relationships proposed by the BPSM in the current study do not occur in isolation; rather, they interact, change, and are synergistic in nature. When included in regression analyses in isolation, an initial variable's effect on the outcome variable will remain consistent, as was seen in mediation analyses performed in Chapter IV. Then, when the mediator variable was added in the regression analysis along with the initial variable, the initial variable's effect on the outcome variable was attenuated. The same effect may be seen if two initial variables are added into the regression analysis along with the mediator variable. Similar changes in effects and relationships may also be seen in the presence of potential moderator variables, such as school type, school level, and geographical location. Effects of a predictor variable differ when simultaneously considered in regression analyses with other predictor variables (Thompson, 2006). In short, viewing

theorized BPSM construct dimension relationships in isolation may not truly represent the interactions of variables when the BPSM is examined in its entirety.

Recommendations

Chapter II

Journal article submission guidelines are imposed for authors who submit a manuscript for publication. Often, guidelines restrict the number of words, pages, tables, figures, and references within submitted manuscripts to be considered for publication. Journal editors function on a finite budget and must carefully choose articles to be published within a particular journal issue. Editors may accept or reject manuscripts due to limited space and the volume of manuscripts submitted for review. In spite of word and page limits stated in submission guidelines, the author recommends researchers should report detailed information concerning survey instrument characteristics in submitted manuscripts. Providing other researchers with instrument-related information including the number of items, number of pages, administration protocol, and time to complete may assist researchers to assess the feasibility, efficacy, and appropriateness of replicating study methods. Manuscripts including validity and reliability testing procedures and psychometric properties for data collected with survey instruments may enable researchers to determine the extent that health behavior may be consistently investigated across samples.

The complex and labor-intensive process of testing data for validity and reliability emphasizes the need to report detailed descriptions of testing procedures and share psychometrically sound measures in published health education literature. Published manuscripts should serve as a guide to other researchers for assessing the quality of findings and determining if study methodology is feasible to replicate. Health education researchers should make available their survey instruments that have undergone rigorous validity and reliability testing for collected data. Because of the complex, labor-intensive nature of testing data for reliability and validity, consistent reporting of the details of testing procedures and psychometrics would allow health education to move forward more rapidly since researchers would not frequently be "re-creating the wheel."

Using an instrument that has been previously validated begins the process of replicating study findings, the possibility for future generalizability across samples, and ultimately understanding complex human health behavior. Advances in technology should be utilized to share survey instruments. Electronic mail listserv may create networks of dedicated health education researchers and websites may serve as hubs for containing easily accessible survey instruments. Currently, the author is creating such an internet-based hub for survey instrument sharing and networking.

Research-related breakthroughs and innovative research strategies are disseminated through the published health education literature. The health education profession advances with each published article. Published articles with high levels of research-related rigor and sophistication are required to drive the field of health

education and ultimately to improve community health and eliminate health disparities. The author recommends journal editors mandate that to be considered for review manuscripts submitted for publication include reliability coefficients for data collected in all instrument scales. Reporting reliability coefficients for data collected with instrument scales can be as effortless as adding one column to an existing article table. Even reporting this minimal amount of information may provide researchers with the necessary baseline measures for comparison in future studies. Unfortunately, not every researcher may find merit in reporting results of psychometric testing; however, journal editors have the power to change submission requirements and influence the direction of health education.

Chapter III

The complex and labor-intensive process of testing data for validity and reliability emphasizes the need for researchers to meticulously document and share testing procedures among the research community. A suitable example of best practice in regard to documenting and sharing psychometric property testing procedures is the methods performed in this chapter for data collected with the AHRBS instrument. The author was able to confirm the structure of these data, as related to the BPSM, and confirm construct validity. The author was able to strengthen the internal consistency reliability for these data in each AHRBS instrument scale and considerably reduce the length of the instrument. Research like this is essential to the health education literature. The SM-AHRBS instrument may be a valuable tool to foster understanding of the

psychological and socioecological factors contributing to adolescent ATOD use. In addition to informing the research community about a survey instrument, which demonstrated strong internal consistency reliability and stability for these data, the methods used to assess these data were clearly and chronologically documented. This article may serve as a guide for researchers to assess the quality of the SM-AHRBS instrument measures and replicate the study methods for data collected with other survey instruments. The author recommends that the SM-AHRBS instrument be administered to collect data from other samples to determine if newly collected data are reliable for theses measures.

The author recommends that health education researchers perform tests of validity and reliability on all data collected with survey instruments. These procedures should be performed after each administration of the survey instrument. Statistical analyses should only be performed using measures that demonstrate acceptable reliability for the data. The author recommends that researchers publish manuscripts using the most parsimonious measures to reduce measurement error, and that they only publish manuscripts using data obtained from reliable measures. The ramifications of analyzing data collected with unreliable measures (or unknown reliability for the data) span beyond a single publication. Data collected with unreliable measures used may yield biased or inaccurate results. Inaccurate results may lead to erroneous interpretation of these results. If published, the research community may use these study findings to support claims and guide research efforts. Conducting psychometric property testing on

collected data and publishing test results may ensure that data used in statistical analyses is reliable and that other researchers may assess the methods and findings of these tests.

Chapter IV

Mediation analyses in this article revealed that characteristics of the adolescent peer group mediate the effects of perceptions of the social environment (i.e., perceived peer disapproval, perceived parental disapproval, and perceived peer behavior) on adolescent lifetime inhalant use. These findings support the theorized mediating relationships proposed by the BPSM. Identifying mediation relationships do not imply causality. Evidence of these relationships and variable interactions is critical to theory testing. Relationships hypothesized by theories should be repeatedly examined in various samples to determine if the proposed variable interactions are consistent. This study filled a void in the literature and provides evidence of validity for the BPSM.

Health education researchers may begin to preliminarily explore relationships between variables by performing mediation analyses. Guided by theory, the series of OLS regression analyses performed in this study were intended to provide evidence of mediating effects as theorized in the BPSM. The author was able to explain the basic relationships between initial, mediator, and outcome variables as a result of mediation analyses. In addition to examining the relationships, this and future research will strive to answer the underlying questions of ‘how’ and ‘why’ these variables interact in the presence of one another. The author recommends that health education researchers not “hunt” for mediating relationships; rather, health education researchers should

systematically explore relationships between variables as indicated by theory or previous literature. To more comprehensively understand the relationships between variables and constructs included within the BPSM, the author recommends using more complex statistical analyses and statistical analysis software.

Future Research

An entire career may begin and end while attempting to analyze all data collected with the AHRBS instrument. Only a portion of the BPSM and a fraction of the construct dimension relationships were examined in Chapter IV. A seemingly infinite amount of relationships and interactions remain unexplored in this dataset. The author recommends a systematic approach to explore proposed BPSM relationships between initial, mediator, and outcome variables.

In future research, the author suggests more testing of the validity and reliability of data collected with survey instruments, report survey instrument characteristics and psychometric property test results in published journal articles, and conduct statistical analyses using only the most parsimonious and reliable scales for collected data. Further, the author recommends that others pursue his recommendations to change author submission guidelines for health education journals to mandate reporting of internal consistency reliability coefficients for all data collected with survey instrument scales.

The author recommends that others use the SM-AHRBS to explore proposed BPSM relationships between initial, mediator, and outcome variables, and that these

relationships are explored in context and in the presence of other variables. The author recommends performing more complex analyses using regression analyses and structural equation modeling (SEM). SEM enables researchers to model constructs as latent variables and not merely as independent measured variables. SEM also has the capability to create complex models that simultaneously examine effects of initial and mediator variables on multiple dependent variables.

The AHRBS instrument includes a total of 21 additional substances to explore. The author recommends creating models to explore relationships between initial, mediator, and outcome variables for each substance. Relationships and interactions between variables and constructs in one model for one substance may change, or cease to exist, in an alternative model for a different substance.

Reflections

Chapter II

If the author were to re-conduct the study methods in Chapter II, the following modifications would be incorporated. First, the author would have constructed a more comprehensive content rubric to analyze the content published in the health education literature concerning survey instrument characteristics and psychometric property reporting for data collected with survey instruments. For example, the author may have expanded the 26-point rubric to investigate explicit statements in the published health education literature specifically related to incorrectly referencing “reliability of survey

instruments" (correctly stated, "reliability of the data collected with a survey instrument"). The author regrets not collecting this information because referring to the reliability of an instrument may mislead journal readers, bring about confusion among the research community, and perpetuate the use of this incorrect phrase among researchers.

Second, the author would have preferred to locate published citations provided in articles that stated "results of psychometric testing are reported elsewhere" or "reliability coefficients for instrument scales are published elsewhere." These and similar statements were occasionally reported in published articles. Locating these articles and evaluating them with the 26-point rubric may have yielded interesting results. The cited reference may have provided sufficient information for journal readers to assess the rigor of psychometric property testing procedures and quality of associated results for the data; however, the cited sources may have provided insufficient information about psychometric property testing procedures and associated results for the data. In the latter example, it would be pointless to force journal article readers to locate cited sources only to determine that the description provided within the source is insufficient and provides limited additional information.

Third, the author would have expanded the number of journal articles examined to have analyzed a more representative sample of published health education journal articles. For example, the author may have expanded the study sample to span 5 or 7 years of published health education literature. Another example may be that the author would have expanded the study sample to analyze the published articles of additional

health education journals. The *American Journal of Health Education* (*AJHE*) is an example of a journal that meets predetermined inclusion criteria consistent with the study. Examining a larger sample of published health education journal articles would have enabled the author to identify trends in survey instrument characteristic and results from psychometric property testing.

Chapter III

If the author were to re-conduct the study methods of Chapter III, the following modifications would be incorporated. First, the author would add items to instrument scales with the lowest reliability for the data (i.e., Impulse Control Scale and Mastery of the External World Scale). Adding items to the scales with the lowest reliability for the data has potential to increase reliability for subsequent administrations of the survey instrument. Second, the author would have field tested the SM-AHRBS on a sample of adolescents. The author would have performed psychometric tests to determine the validity and reliability of new data collected with the SM-AHRBS instrument. Had this field test been performed, the author would have been able to assess the stability of reliability coefficients for the new data collected with the SM-AHRBS instrument. Further, reliability coefficients could have been compared across samples. If similarities were determined, the author would have concluded that the SM-AHRBS instrument is a valuable tool for collecting information related to psychological and socioecological factors contributing to adolescent ATOD use.

Chapter IV

If the author were to re-conduct the study methods of Chapter IV, the following modifications would be incorporated. First, the author would have performed additional Baron and Kenny three-step mediation analyses to examine the mediated effects of combinations of initial variables on adolescent lifetime inhalant use. For this dissertation, the author performed a series of OLS regressions to examine the mediated effects of perceived peer disapproval on adolescent lifetime inhalant use in the presence of the mediator variable, characteristics of the adolescent peer group. The author repeated the process to examine the mediated effects of perceived parental disapproval on adolescent lifetime inhalant use in the presence of the mediator variable. Then, the author repeated this process again to examine the mediated effects of perceived peer behavior on adolescent lifetime inhalant use in the presence of the mediator variable. These mediation analyses were performed independently of one another and the resulting mediated effects did not consider interactions between multiple initial variables. To examine the mediated effects of combinations of initial variables on adolescent lifetime inhalant use, the author would have performed an all-possible-subsets analysis on the variables of interest. Performing these analyses would have provided additional preliminary information about the relationships and interactions between initial, mediator, and outcome variables.

Second, the author would have reproduced the procedures performed in this article to examine relationships between initial, mediator, and outcome variables in the unexamined portions of the BPSM. For example, the author could have performed

analyses to examine the mediated effects of body image on adolescent lifetime inhalant use in the presence of the mediator variable illicit drug-related perceptions of risk. Another example would be to examine the mediated effects of adolescent impulse control on adolescent lifetime inhalant use in the presence of the mediator variable perceived risks versus benefits. Performing these additional mediation analyses may have provided the author with more evidence to support the theorized mediating relationships within the BPSM.

Conclusions

Relevance to Health Education Research

The relevance of these dissertation study findings to health education research is direct; following best practice fosters best practice. By analyzing the published literature, health education researchers become aware of the actions of other health education researchers. Critically analyzing the published health education literature enables health education researchers to track the advancement of the profession, identify its strengths and weaknesses, and incorporate research trends into applied health education. Infrequent and inconsistent reporting of instrument-related information is a disservice to journal readers and the research community. Despite page and word limitations, authors should strive to report instrument-related information in manuscripts submitted for publication, and journal editors should mandate that articles submitted for

publication include internal consistency reliability coefficients for all scales used to collect data.

The validity and reliability of data collected with a survey instrument is elemental to research findings. Performing psychometric property testing has potential to advance health education as a field of study because, when used to analyze data, reliable measures for data yield more precise and accurate results. Performing psychometric property testing for data collected with survey instruments reduces measurement error, fosters replicability, and after repeated administrations of the instrument may enable researchers to generalize findings beyond the samples for which data were collected. Documenting these analytic procedures to test data for validity and reliability is essential for researchers to assess the quality of reported data and the feasibility and efficacy of replicating study methods.

Incorporating parsimonious and reliable measures for data into research analyses increases the likelihood that results are accurate. Statistical analyses should not be performed until researchers have tested the data for reliability. Once reliability of data has been confirmed, researchers can commence examining relationships between variables. Theory testing promotes understanding of complex health issues and relationships between variables of interest. Examining relationships between variables may either confirm theorized relationships or contribute to new theory building.

Relevance to Applied Health Education

The relevance of these dissertation study findings to applied health education relates to having confidence in published study findings and integrating theory into practice. Authors who have followed the procedures and recommendations outlined in this study may publish health education articles that enable other researchers and practitioners to use research findings with more confidence. Increased accuracy in research findings may result in more accurate interpretations of theoretical relationships between variables of interest. In turn, these interpretations may result in practitioners recognizing the relevance and importance of researchers' interpretations. Practitioners may then use these interpretations to shape program mission statements, goals, and objectives for services and educational sessions they provide. If executed effectively, program services have potential to change participants' health-related knowledge, attitudes, beliefs, intentions, and behaviors. As a result of these accumulative events, the best practices of health education researchers may facilitate an environment to improve health for all and eliminate health disparities.

The SM-AHRBS instrument may be a valuable tool to collect information about psychological and socioecological factors that influence ATOD use among adolescents. These findings may then be used in collaborative partnerships between institutions of higher learning and community-based organizations to integrate theoretical psychological and socioecological construct dimension relationships into daily practice. Study findings resulting from accurate analyses may be incorporated into ATOD prevention initiatives in academic, community, and clinical settings. Collecting this

information about adolescent ATOD use, and the theorized contributing factors, may enable community-based health organizations to obtain national, state, local, governmental, or private funding for health programs and prevention interventions.

It is unrealistic to assume that this dissertation will change the entire direction of the health education profession; however, if just one health education researcher reads this document and modifies their current research practices, the effects may be staggering. If a handful of researchers read this dissertation and modify their practices, the effects will be even more exponential. If even one journal editor makes the executive decision to mandate that reliability coefficients for data collected with survey instrument scales be reported in published articles, health education as a field of study may be redefined by increased standards for quality and sophisticated research findings published in the literature.

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APPENDIX A

ALPHABETICAL AND CHRONOLOGICAL LIST OF REVIEWED JOURNAL ISSUES

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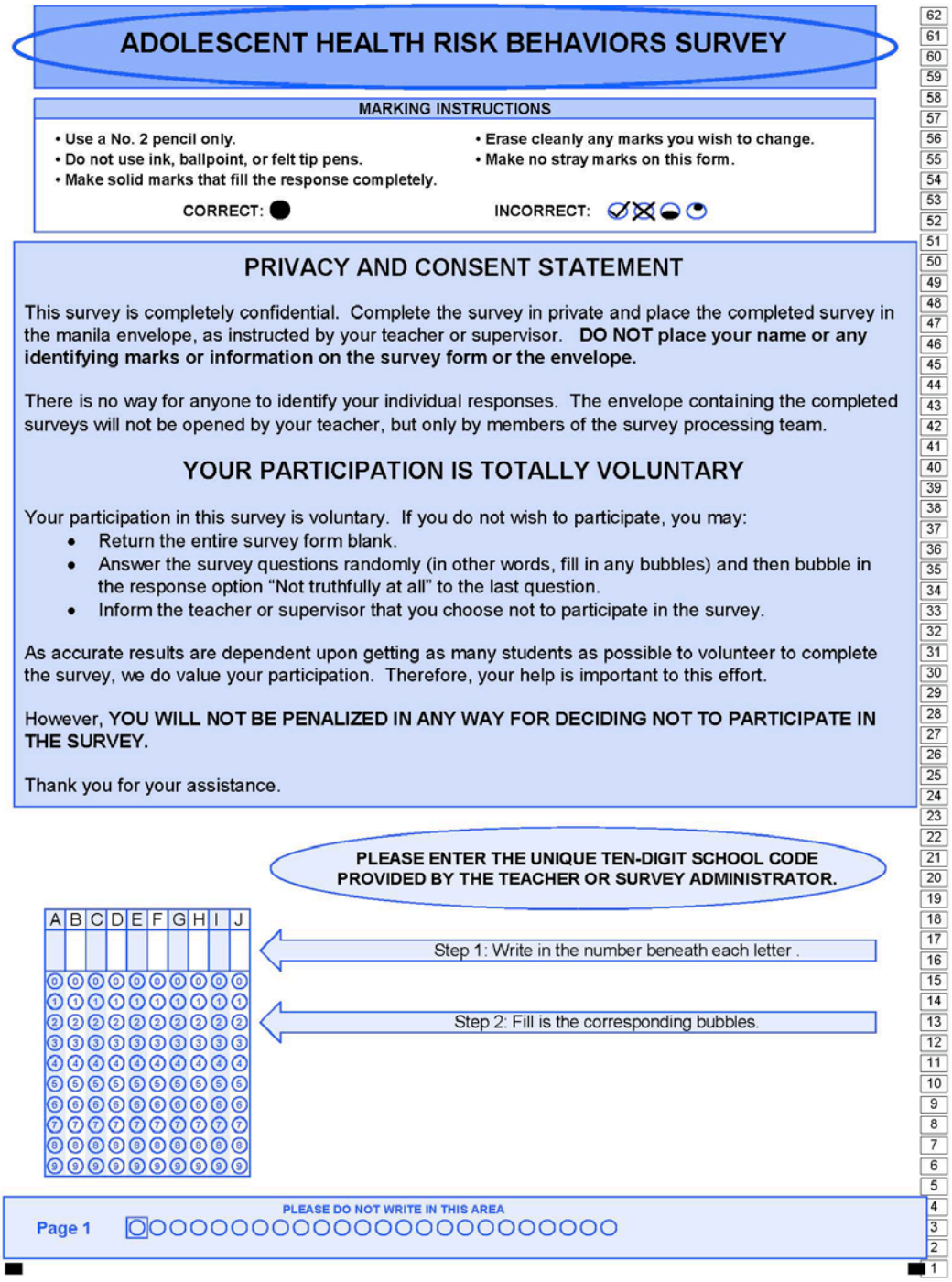
International Electronic Journal of Health Education
Volume 9, 2006
Volume 10, 2007

APPENDIX B

THE ADOLESCENT HEALTH RISK BEHAVIOR SURVEY INSTRUMENT



ADOLESCENT HEALTH RISK BEHAVIORS SURVEY

MARKING INSTRUCTIONS

- Use a No. 2 pencil only.
- Do not use ink, ballpoint, or felt tip pens.
- Make solid marks that fill the response completely.
- Erase cleanly any marks you wish to change.
- Make no stray marks on this form.

CORRECT: ● INCORRECT: ⊘ ⊠ ◒ ◔

PRIVACY AND CONSENT STATEMENT

This survey is completely confidential. Complete the survey in private and place the completed survey in the manila envelope, as instructed by your teacher or supervisor. **DO NOT place your name or any identifying marks or information on the survey form or the envelope.**

There is no way for anyone to identify your individual responses. The envelope containing the completed surveys will not be opened by your teacher, but only by members of the survey processing team.

YOUR PARTICIPATION IS TOTALLY VOLUNTARY

Your participation in this survey is voluntary. If you do not wish to participate, you may:

- Return the entire survey form blank.
- Answer the survey questions randomly (in other words, fill in any bubbles) and then bubble in the response option "Not truthfully at all" to the last question.
- Inform the teacher or supervisor that you choose not to participate in the survey.

As accurate results are dependent upon getting as many students as possible to volunteer to complete the survey, we do value your participation. Therefore, your help is important to this effort.

However, **YOU WILL NOT BE PENALIZED IN ANY WAY FOR DECIDING NOT TO PARTICIPATE IN THE SURVEY.**

Thank you for your assistance.

PLEASE ENTER THE UNIQUE TEN-DIGIT SCHOOL CODE PROVIDED BY THE TEACHER OR SURVEY ADMINISTRATOR.

A B C D E F G H I J

Step 1: Write in the number beneath each letter .

Step 2: Fill is the corresponding bubbles.

PLEASE DO NOT WRITE IN THIS AREA

Page 1

AGE IN YEARS
0 0 | 1 1 | 2 2 | 3 3 | 4 4 | 5 5 | 6 6 | 7 7 | 8 8 | 9 9

GENDER
0 Male
1 Female

GRADE
0 6th
1 7th
2 8th
3 9th
4 10th
5 11th
6 12th

ETHNIC ORIGIN
How do you describe yourself?
(Mark all that apply)

0 White or Caucasian
1 Black or African American
2 Hispanic or Latino
3 Native Hawaiian or Other Pacific Islander
4 American Indian or Alaskan Native
5 Other

---

1. Which family members live with you? Mark all that apply.

- ◯ Father
- ◯ Mother
- ◯ Stepfather
- ◯ Stepmother
- ◯ Older sibling (please specify the number _____)
- ◯ Younger sibling (please specify the number _____)
- ◯ Grandfather
- ◯ Grandmother
- ◯ Others (please specify the number _____)

2. Which of these comes closest to describing your parents' educational backgrounds? (Mark one for each parent)

Mother	*Father*	
0	0	Junior high school
1	1	Senior high school
2	2	Junior college / college work / college degree
3	3	Some graduate work / master's degree
4	4	Professional degree / doctoral degree (e.g., M.D., Ph.D.)

3. What are your parents' work status'? (Mark one for each parent)

Mother	*Father*	
0	0	Working full-time
1	1	Working part-time
2	2	Not working

PLEASE DO NOT WRITE IN THIS AREA

PLEASE DO NOT WRITE IN THIS AREA

How well do the following statements describe you? Rate each statement on the following scale by filling in bubble which best fits.

	Describes me very well	Describes me well	Describes me fairly well	Does not quite describe me	Does not describe me well	Does not describe me at all
1. I "lose my head" easily	0	1	2	3	4	5
2. At times I have crying and/or laughing fits that I seem unable to control	0	1	2	3	4	5
3. I can take criticism without resentment	0	1	2	3	4	5
4. Even under pressure I manage to remain calm	0	1	2	3	4	5
5. I keep an even temper most of the time	0	1	2	3	4	5
6. I fear something constantly	0	1	2	3	4	5
7. Usually I control myself	0	1	2	3	4	5
8. In the past year I have been very worried about my health	0	1	2	3	4	5
9. I am proud of my body	0	1	2	3	4	5
10. I seem to be forced to imitate people I like	0	1	2	3	4	5
11. Very often I think that I am not at all the person I would like to be	0	1	2	3	4	5
12. I frequently feel ugly and unattractive	0	1	2	3	4	5
13. When others look at me they must think that I am poorly developed	0	1	2	3	4	5
14. I feel strong and healthy	0	1	2	3	4	5
15. If I put my mind to it, I can learn almost anything	0	1	2	3	4	5
16. When I decide to do something, I do it.	0	1	2	3	4	5
17. I find life an endless series of problems without a solution in sight	0	1	2	3	4	5
18. I feel that I am able to make decisions	0	1	2	3	4	5
19. I feel that I have no talent whatsoever	0	1	2	3	4	5

20. How often do you compare how well things are going for you in general (socially, personally, etc.) with other people?

0 Never 1 Rarely 2 Usually 3 Often 4 Always

21. When you receive exam scores back, how likely is it that you would compare your current score with how well you did on *previous* exams?

0 Least likely
1 Less likely
2 Don't know
3 More likely
4 Most likely

22. When you receive exam scores back, how likely is it that you would compare your current score with how well others did on the same exam?

0 Least likely
1 Less likely
2 Don't know
3 More likely
4 Most likely

Please indicate how much each of the following words describes you
(For example, if you think you are a little more popular than most people your age, then you'd answer with a '5' on the scale").

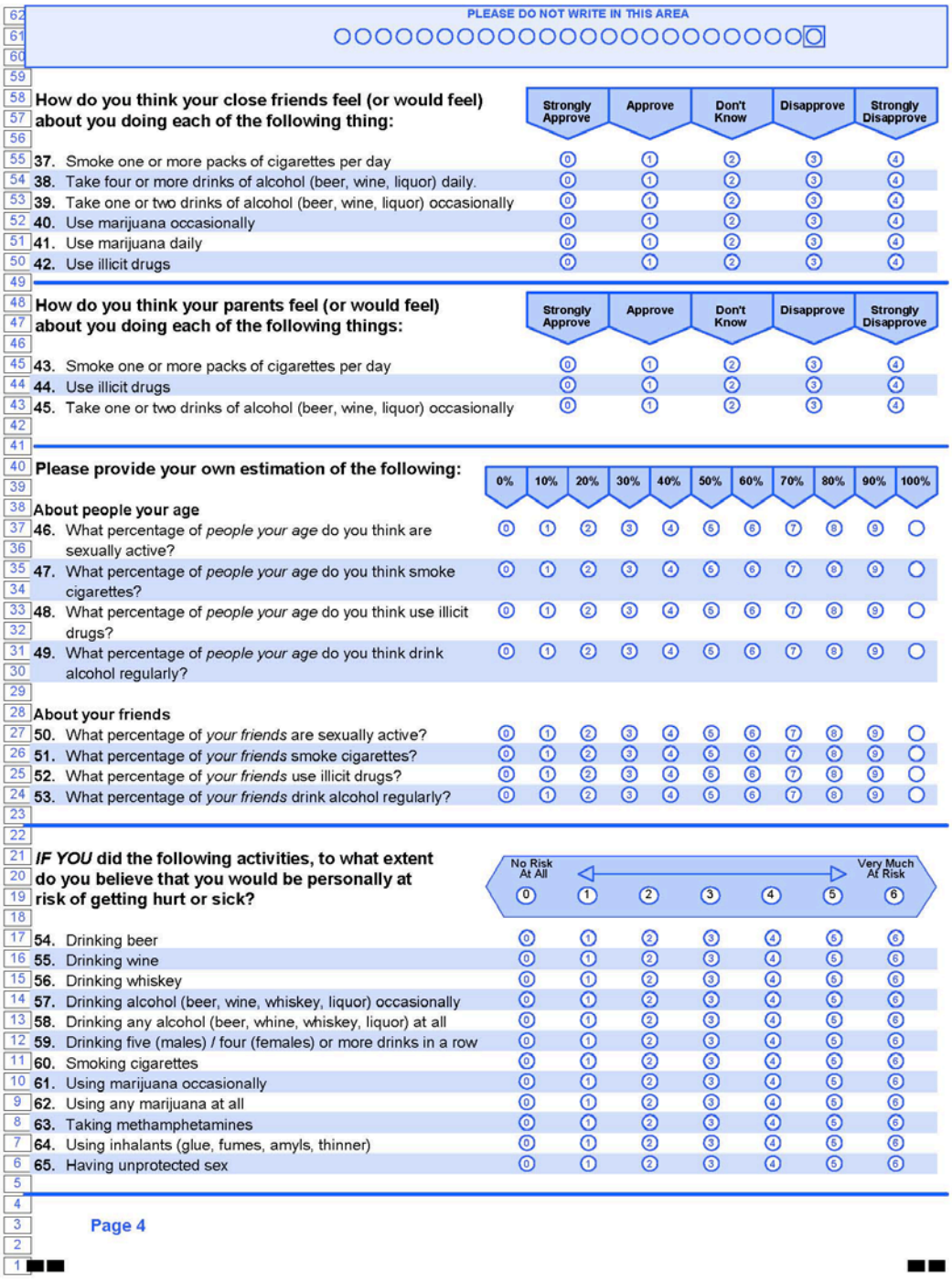
	Not at all like me 0	1	2	3	Exactly like me 4
23. Popular	0	1	2	3	4
24. Smart	0	1	2	3	4
25. Considerate	0	1	2	3	4
26. Confused	0	1	2	3	4
27. Immature	0	1	2	3	4
28. "Cool" (sophisticated)	0	1	2	3	4

	Not at all like me 0	1	2	3	Exactly like me 4
29. Self-confident	0	1	2	3	4
30. Unattractive	0	1	2	3	4
31. Dull (boring)	0	1	2	3	4
32. Independent	0	1	2	3	4
33. Careless	0	1	2	3	4
34. Self-centered	0	1	2	3	4

Please indicate how well the following describes you by bubbling in "true" or "false."

35. More often than not I feel put down by the kids at school. 0 True 1 False

36. My parents do not like me very much. 0 True 1 False



PLEASE DO NOT WRITE IN THIS AREA

How do you think your close friends feel (or would feel) about you doing each of the following thing:

	Strongly Approve	Approve	Don't Know	Disapprove	Strongly Disapprove
37. Smoke one or more packs of cigarettes per day	0	1	2	3	4
38. Take four or more drinks of alcohol (beer, wine, liquor) daily.	0	1	2	3	4
39. Take one or two drinks of alcohol (beer, wine, liquor) occasionally	0	1	2	3	4
40. Use marijuana occasionally	0	1	2	3	4
41. Use marijuana daily	0	1	2	3	4
42. Use illicit drugs	0	1	2	3	4

How do you think your parents feel (or would feel) about you doing each of the following things:

	Strongly Approve	Approve	Don't Know	Disapprove	Strongly Disapprove
43. Smoke one or more packs of cigarettes per day	0	1	2	3	4
44. Use illicit drugs	0	1	2	3	4
45. Take one or two drinks of alcohol (beer, wine, liquor) occasionally	0	1	2	3	4

Please provide your own estimation of the following:

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
About people your age											
46. What percentage of *people your age* do you think are sexually active?	0	1	2	3	4	5	6	7	8	9	○
47. What percentage of *people your age* do you think smoke cigarettes?	0	1	2	3	4	5	6	7	8	9	○
48. What percentage of *people your age* do you think use illicit drugs?	0	1	2	3	4	5	6	7	8	9	○
49. What percentage of *people your age* do you think drink alcohol regularly?	0	1	2	3	4	5	6	7	8	9	○
About your friends											
50. What percentage of *your friends* are sexually active?	0	1	2	3	4	5	6	7	8	9	○
51. What percentage of *your friends* smoke cigarettes?	0	1	2	3	4	5	6	7	8	9	○
52. What percentage of *your friends* use illicit drugs?	0	1	2	3	4	5	6	7	8	9	○
53. What percentage of *your friends* drink alcohol regularly?	0	1	2	3	4	5	6	7	8	9	○

***IF YOU* did the following activities, to what extent do you believe that you would be personally at risk of getting hurt or sick?**

	No Risk At All						Very Much At Risk
	0	1	2	3	4	5	6
54. Drinking beer	0	1	2	3	4	5	6
55. Drinking wine	0	1	2	3	4	5	6
56. Drinking whiskey	0	1	2	3	4	5	6
57. Drinking alcohol (beer, wine, whiskey, liquor) occasionally	0	1	2	3	4	5	6
58. Drinking any alcohol (beer, whine, whiskey, liquor) at all	0	1	2	3	4	5	6
59. Drinking five (males) / four (females) or more drinks in a row	0	1	2	3	4	5	6
60. Smoking cigarettes	0	1	2	3	4	5	6
61. Using marijuana occasionally	0	1	2	3	4	5	6
62. Using any marijuana at all	0	1	2	3	4	5	6
63. Taking methamphetamines	0	1	2	3	4	5	6
64. Using inhalants (glue, fumes, amyls, thinner)	0	1	2	3	4	5	6
65. Having unprotected sex	0	1	2	3	4	5	6

PLEASE DO NOT WRITE IN THIS AREA

IF some other person your age engaged in the following activities, to what extent do you believe that he/she would be at risk of getting hurt or sick?

	No Risk At All 0	1	2	3	4	5	Very Much At Risk 6
66. Drinking beer	0	1	2	3	4	5	6
67. Drinking wine	0	1	2	3	4	5	6
68. Drinking whiskey	0	1	2	3	4	5	6
69. Drinking five (males) / four (females) or more drinks in a row	0	1	2	3	4	5	6
70. Smoking cigarettes	0	1	2	3	4	5	6
71. Taking methamphetamines	0	1	2	3	4	5	6
72. Using inhalants (glue, fumes, amyls, thinner)	0	1	2	3	4	5	6
73. Having unprotected sex	0	1	2	3	4	5	6

To what extent are the benefits or pleasures provided by each of the following activities greater than the risks associated with it?

	Risks *much greater* than the benefits 0	Risks *greater* than the benefits 1	Risks *slightly greater* than the benefits 2	Undecided 3	Benefits *slightly greater* than the risks 4	Benefits *greater* than the risks 5	Benefits *much greater* than the risks 6
74. Drinking beer	0	1	2	3	4	5	6
75. Drinking wine	0	1	2	3	4	5	6
76. Drinking whiskey	0	1	2	3	4	5	6
77. Drinking 5 (males) / 4 (females) drinks or more in a row	0	1	2	3	4	5	6
78. Smoking cigarettes	0	1	2	3	4	5	6
79. Taking methamphetamines	0	1	2	3	4	5	6
80. Using inhalants (glue, fumes, amyls, thinner)	0	1	2	3	4	5	6
81. Having unprotected sex	0	1	2	3	4	5	6

Please answer the following questions by bubbling in the appropriate response.

82. Have you ever smoked cigarettes?

0 Never smoked
1 Once or twice
2 Occasionally, but not regularly
3 Regularly in the past
4 Regularly now

83. If you have ever smoked cigarettes, at what age did you first use them?

0 Never smoked
1 7 years old or less
2 8 - 9 years old
3 10 -12 years old
4 13 - 15 years old
5 16 - 17 years old
6 18 or more years old

84. How often in the *last year* have you smoked cigarettes?

0 None
1 1 - 5 times
2 6 - 19 times
3 20 - 40 times
4 More than 40 times

85. Do either or both of your parents smoke?

0 Only father smokes
1 Only mother smokes
2 Both father and mother smoke
3 Neither father nor mother smoke

86. Do any one of your brothers or sisters smoke?

0 Yes (write in the numer of siblings who smoke _____)
1 No

87. How many of your friends smoke?

0 None 1 One 2 Two 3 Three 4 More than 3

If more than 3 friends smoke, indicate how many by writing the number in the box. ☐

88. If you have ever used marijuana, at what age did you first use it?

0 Never used marijuana
1 7 years old or less
2 8-10 years old
3 10-12 years old
4 13-15 years old
5 16 - 17 years old
6 18 or more years old

89. If you have ever drank alcohol, at what age did you first drink?

0 Never drank alcohol
1 7 years old or less
2 8-10 years old
3 10-12 years old
4 13-15 years old
5 16 - 17 years old
6 18 or more years old

90. Compared to others your age, would you say your health is. . .

0 Excellent 1 Good 2 Fair 3 Poor

PLEASE DO NOT WRITE IN THIS AREA

Please answer the following questions by bubbling in the appropriate response.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
91. Smoking is OK as long as you don't smoke too many.	0	1	2	3	4
92. A person who eats right and exercises regularly can smoke without harming his/her health.	0	1	2	3	4
93. If you are young and healthy, cigarette smoking is not dangerous.	0	1	2	3	4
94. The anti-smoking ads twist the facts to make cigarette smoking look worse for your health that it really is.	0	1	2	3	4
95. If I smoke cigarettes, I will live for a long time.	0	1	2	3	4
96. If I smoke cigarettes, I will live a healthy life.	0	1	2	3	4
97. If I smoke cigarettes, I will get lung cancer.	0	1	2	3	4
98. If I smoke cigarettes, I will get heart disease.	0	1	2	3	4
99. If I smoke cigarettes, I will cough.	0	1	2	3	4
100. If I smoke cigarettes, I will feel good.	0	1	2	3	4
101. If I smoke cigarettes, I will be able to relax.	0	1	2	3	4
102. If I smoke cigarettes, I will be able to get away from my problems.	0	1	2	3	4
103. If I smoke cigarettes, I will be less nervous is social situations.	0	1	2	3	4
104. If I smoke cigarettes, I will be able to concentrate better at work and/or school.	0	1	2	3	4
105. If I smoke cigarettes, I will be hooked.	0	1	2	3	4
106. If I smoke cigarettes, I will feel left out of the group.	0	1	2	3	4
107. If I smoke cigarettes, I will lose my friends.	0	1	2	3	4
108. The goal of achieving a healthy lifestyle is an important influence on my behavior.	0	1	2	3	4

109. If I smoke cigarettes, that is because it is . . .

0 Not applicable; I don't smoke
1 Very pleasant
2 Pleasant
3 Neither pleasant nor unpleasant
4 Unpleasant
5 Very unpleasant

110. If I smoke cigarettes, that is because it is . . .

0 Not applicable; I don't smoke
1 Very nice
2 Nice
3 Neither nice nor awful
4 Awful
5 Very awful

111. If I smoke cigarettes, that is because it is . . .

0 Not applicable; I don't smoke
1 A lot of fun
2 Fun
3 A little fun
4 Not fun
5 Not fun at all

Please mark the choice that shows how much you agree or disagree with each statement about your friends.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
112. Most of my friends think that getting good grades is important.	0	1	2	3	4
113. Most of my friends think school is a pain.	0	1	2	3	4
114. My friends often try to get me to do things the teacher doesn't like.	0	1	2	3	4

Please think of your best friend in this school. As far as you know, rate how much you agree with the following statements about him/her.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
115. Is interested in school.	0	1	2	3	4
116. Attends class regularly.	0	1	2	3	4
117. Plans to go to college.	0	1	2	3	4
118. Belongs to a gang.	0	1	2	3	4
119. Gets in trouble with the police.	0	1	2	3	4

120. How many of your friends have been picked up by the police?

0 None 1 One 2 Some 3 Most 4 All

121. How many times in the last two weeks have you had five or more alcoholic drinks (beer, wine, liquor) in a sitting?

0 None
1 Once
2 Twice
3 3 to 5 times
4 6 to 9 times
5 10 or more times

LIFETIME USE:

HAVE YOU *EVER* USED. . .?

	Never	1-5 Times	6-19 Times	20-40 Times	More than 40 Times
122. **Snuff/Smokeless tobacco**	0	1	2	3	4
123. **Cigars** (tobacco)	0	1	2	3	4
124. **Pipe** (tobacco)	0	1	2	3	4
125. **Alcohol** (beer, wine, wine coolers, liquor)	0	1	2	3	4
126. **Marijuana** (hashish or hash oil)	0	1	2	3	4
127. **Cocaine**	0	1	2	3	4
128. **Crack**	0	1	2	3	4
129. **Inhalants** (huffing glue, fumes, amyls)	0	1	2	3	4
130. **Amphetamines** (uppers)	0	1	2	3	4
131. **Methamphetamines** (meth, crank, crystal)	0	1	2	3	4
132. **Ritalin** (non-prescribed use only)	0	1	2	3	4
133. **Methcanthinone** (cat)	0	1	2	3	4
134. **Tranquilizers or Sleeping Pills** (downers) (non-prescribed)	0	1	2	3	4
135. **Narcotics** (opium, morphine, codeine) (non-prescribed)	0	1	2	3	4
136. **Heroin**	0	1	2	3	4
137. **LSD** (acid)	0	1	2	3	4
138. **MDMA** (ecstasy, XTC, X)	0	1	2	3	4
139. **Other Psychedelics** (psilocybin, mescaline, etc.)	0	1	2	3	4
140. **Rohypnol** (Roofies)	0	1	2	3	4
141. **GHB**	0	1	2	3	4
142. **Steroids** (non-prescribed use)	0	1	2	3	4
143. **A needle or syringe to inject a drug**	0	1	2	3	4

144. **If you have ever used inhalants (huffing glue, fumes, amyls), at what age did you first use them?**

- 0 Never used inhalants
- 1 7 years old or less
- 2 8 - 9 years old
- 3 10 -12 years old
- 4 13 - 15 years old
- 5 16 - 17 years old
- 6 18 or more years old

ANNUAL USE

HOW MANY TIMES IN THE *LAST YEAR* HAVE YOU USED. . .?

	Never	1-5 Times	6-19 Times	20-40 Times	More than 40 Times
145. **Snuff/Smokeless tobacco**	0	1	2	3	4
146. **Cigars** (tobacco)	0	1	2	3	4
147. **Pipe** (tobacco)	0	1	2	3	4
148. **Alcohol** (beer, wine, wine coolers, liquor)	0	1	2	3	4
149. **Marijuana** (hashish or hash oil)	0	1	2	3	4
150. **Cocaine**	0	1	2	3	4
151. **Crack**	0	1	2	3	4
152. **Inhalants** (huffing glue, fumes, amyls)	0	1	2	3	4
153. **Amphetamines** (uppers)	0	1	2	3	4
154. **Methamphetamines** (meth, crank, crystal)	0	1	2	3	4
155. **Ritalin** (non-prescribed use only)	0	1	2	3	4
156. **Methcanthinone** (cat)	0	1	2	3	4
157. **Tranquilizers or Sleeping Pills** (downers) (non-prescribed)	0	1	2	3	4
158. **Narcotics** (opium, morphine, codeine) (non-prescribed)	0	1	2	3	4
159. **Heroin**	0	1	2	3	4
160. **LSD** (acid)	0	1	2	3	4
161. **MDMA** (ecstasy, XTC, X)	0	1	2	3	4
162. **Other Psychedelics** (psilocybin, mescaline, etc.)	0	1	2	3	4
163. **Rohypnol** (Roofies)	0	1	2	3	4
164. **GHB**	0	1	2	3	4
165. **Steroids** (non-prescribed use)	0	1	2	3	4
166. **A needle or syringe to inject a drug**	0	1	2	3	4

PLEASE DO NOT WRITE IN THIS AREA

USE IN PAST MONTH

HOW MANY TIMES IN THE PAST MONTH (30 DAYS) HAVE YOU USED. . .?

	Never	1-5 Times	6-19 Times	20-40 Times	More than 40 Times
167. **Cigarettes**	0	1	2	3	4
168. **Snuff/Smokeless tobacco**	0	1	2	3	4
169. **Cigars** (tobacco)	0	1	2	3	4
170. **Pipe** (tobacco)	0	1	2	3	4
171. **Alcohol** (beer, wine, wine coolers, liquor)	0	1	2	3	4
172. **Marijuana** (hashish or hash oil)	0	1	2	3	4
173. **Cocaine**	0	1	2	3	4
174. **Crack**	0	1	2	3	4
175. **Inhalants** (huffing glue, fumes, amyls)	0	1	2	3	4
176. **Amphetamines** (uppers)	0	1	2	3	4
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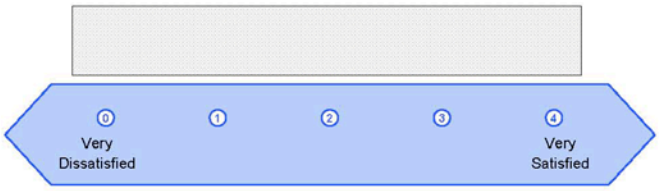
178. **Ritalin** (non-prescribed use only)	0	1	2	3	4
179. **Methcanthinone** (cat)	0	1	2	3	4
180. **Tranquilizers or Sleeping Pills** (downers) (non-prescribed)	0	1	2	3	4
181. **Narcotics** (opium, morphine, codeine) (non-prescribed)	0	1	2	3	4
182. **Heroin**	0	1	2	3	4
183. **LSD** (acid)	0	1	2	3	4
184. **MDMA** (ecstasy, XTC, X)	0	1	2	3	4
185. **Other Psychedelics** (psilocybin, mescaline, etc.)	0	1	2	3	4
186. **Rohypnol** (Roofies)	0	1	2	3	4
187. **GHB**	0	1	2	3	4
188. **Steroids** (non-prescribed use)	0	1	2	3	4
189. **A needle or syringe to inject a drug**	0	1	2	3	4

190. **HOW MUCH ARE YOU SATISFIED WITH YOUR LIFE?**



HOW TRUTHFULLY DID YOU ANSWER THESE QUESTIONS?

0 Not truthfully at all 1 Somewhat truthfully 2 Quite Truthfully

YOU HAVE COMPLETED THE SURVEY!
THANK YOU!

PLEASE DO NOT WRITE IN THIS AREA

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APPENDIX C

THE SMITH-MODIFIED ADOLESCENT HEALTH RISK BEHAVIOR SURVEY INSTRUMENT

THE SMITH-MODIFIED
ADOLESCENT HEALTH RISK BEHAVIORS SURVEY

MARKING INSTRUCTIONS

- Use a No. 2 pencil or a blue or black ink pen only.
- Do not use pens with ink that soaks through the paper.
- Make solid marks that fill the response completely.

CORRECT:  INCORRECT: 

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Thank you for your assistance.

63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

AGE IN YRS

0 0
1 1
2 2
3
4
5
6
7
8
9

GENDER

- ○ Male
- ○ Female

GRADE

- ○ 7th
- ○ 8th
- ○ 9th
- ○ 10th
- ○ 11th
- ○ 12th

ETHNIC ORIGIN
How do you describe yourself?
(Mark all that apply)

- ⓪ White or Caucasian
- ① Black or African American
- ② Hispanic or Latino
- ③ Native Hawaiian or Other Pacific Islander
- ④ American Indian or Alaskan Native
- ⑤ Other

---

1. **Please check ✓ all family members who live with you.**
   - ○ Father
   - ○ Mother
   - ○ Stepfather
   - ○ Stepmother
   - ○ Older sibling (please specify the number _____)
   - ○ Younger sibling (please specify the number _____)
   - ○ Grandfather
   - ○ Grandmother
   - ○ Others (please specify the number _____)

2. **Which of these comes closest to describing your parents' educational backgrounds? (Mark one for each parent)**

Mother	*Father*	
○	○	Junior high school
○	○	Senior high school
○	○	Junior college / college work / college degree
○	○	Some graduate work / master's degree
○	○	Professional degree / doctoral degree (e.g., M.D., Ph.D.)

3. **What are your parents' work status'? (Mark one for each parent)**

Mother	*Father*	
○	○	Working full-time
○	○	Working part-time
○	○	Not working

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How well do the following statements describe you? Rate each statement on the following scale by filling in bubble which best fits.

	Describes me very well	Describes me well	Describes me fairly well	Does not quite describe me	Does not describe me well	Does not describe me at all
1. I can take criticism without resentment	○	○	○	○	○	○
2. Even under pressure I manage to remain calm	○	○	○	○	○	○
3. I keep an even temper most of the time	○	○	○	○	○	○
4. Usually I control myself	○	○	○	○	○	○
5. I am proud of my body	○	○	○	○	○	○
6. Very often I think that I am not at all the person I would like to be	○	○	○	○	○	○
7. I frequently feel ugly and unattractive	○	○	○	○	○	○
8. When others look at me they must think that I am poorly developed	○	○	○	○	○	○
9. I feel strong and healthy	○	○	○	○	○	○
10. If I put my mind to it, I can learn almost anything	○	○	○	○	○	○
11. When I decide to do something, I do it.	○	○	○	○	○	○

Please indicate how much each of the following words describes you (For example, if you think you are a little more popular than most people your age, then you'd answer with a '5' on the scale").

	Not al all like me ①	②	③	④	Exactly like me ⑤
12. Popular	①	②	③	④	⑤
13. Smart	①	②	③	④	⑤
14. Considerate	①	②	③	④	⑤
15. Confused	①	②	③	④	⑤
16. Immature	①	②	③	④	⑤
17. "Cool" (sophisticated)	①	②	③	④	⑤

	Not al all like me ①	②	③	④	Exactly like me ⑤
18. Self-confident	①	②	③	④	⑤
19. Unattractive	①	②	③	④	⑤
20. Dull (boring)	①	②	③	④	⑤
21. Independent	①	②	③	④	⑤
22. Careless	①	②	③	④	⑤
23. Self-centered	①	②	③	④	⑤

How do you think your close friends feel (or would feel) about you doing each of the following thing:

	Strongly Approve	Approve	Don't Know	Disapprove	Strongly Disapprove
24. Smoke one or more packs of cigarettes per day	○	○	○	○	○
25. Take four or more drinks of alcohol (beer, wine, liquor) daily.	○	○	○	○	○
26. Use marijuana occasionally	○	○	○	○	○
27. Use marijuana daily	○	○	○	○	○
28. Use illicit drugs	○	○	○	○	○

How do you think your parents feel (or would feel) about you doing each of the following thing:

	Strongly Approve	Approve	Don't Know	Disapprove	Strongly Disapprove
29. Smoke one or more packs of cigarettes per day	○	○	○	○	○
30. Use illicit drugs	○	○	○	○	○

Please provide your own estimation of the following:

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
31. What percentage of *people your age* do you think are sexually active?	○	○	○	○	○	○	○	○	○	○	○
32. What percentage of *people your age* do yout think smoke cigarettes?	○	○	○	○	○	○	○	○	○	○	○
33. What percentage of *people your age* do you think use illicit drugs?	○	○	○	○	○	○	○	○	○	○	○
34. What percentage of *people your age* do you think drink alcohol regularly?	○	○	○	○	○	○	○	○	○	○	○

SMITH-MODIFIED AHRBS INSTRUMENT

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IF YOU did the following activities, to what extent do you believe that you would be personally at risk of getting hurt or sick?	No Risk At All						Very Much At Risk
	1	2	3	4	5	6	7
35. Drinking beer	1	2	3	4	5	6	7
36. Drinking wine	1	2	3	4	5	6	7
37. Drinking whiskey	1	2	3	4	5	6	7
38. Drinking alcohol (beer, wine, whiskey, liquor) occasionally	1	2	3	4	5	6	7
39. Drinking any alcohol (beer wine, whiskey, liquor) at all	1	2	3	4	5	6	7
40. Taking methamphetamines	1	2	3	4	5	6	7
41. Using inhalants (glue, fumes, amyls, thinner)	1	2	3	4	5	6	7

IF some other person your age engaged in the following activities, to what extent do you believe that he/she would be at risk of getting hurt or sick?	No Risk At All						Very Much At Risk
	1	2	3	4	5	6	7
42. Drinking beer	1	2	3	4	5	6	7
43. Drinking wine	1	2	3	4	5	6	7
44. Drinking whiskey	1	2	3	4	5	6	7
45. Taking methamphetamines	1	2	3	4	5	6	7
46. Using inhalants (glue, fumes, amyls, thinner)	1	2	3	4	5	6	7

To what extent are the benefits or pleasures provided by each of the following activities greater than the risks associated with it?	Risks *much greater* than the benefits	Risks *greater* than the benefits	Risks *slightly greater* than the benefits	Undecided	Benefits *slightly greater* than the risks	Benefits *greater* than the risks	Benefits *much greater* than the risks
	1	2	3	4	5	6	7
47. Taking methamphetamines	1	2	3	4	5	6	7
48. Using inhalants (glue, fumes, amyls, thinner)	1	2	3	4	5	6	7

Please think of your best friend in this school. As far as you know, rate how much you agree with the following statements about him/her.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	○	○	○	○	○
49. Think getting good grades is important	○	○	○	○	○
50. Is interested in school.	○	○	○	○	○
51. Attends class regularly.	○	○	○	○	○
52. Plans to go to college.	○	○	○	○	○

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LIFETIME USE:

HAVE YOU EVER USED. . .?

	Never	1-5 Times	6-19 Times	20-40 Times	More than 40 Times
53. Snuff/Smokeless tobacco	○	○	○	○	○
54. Cigars (tobacco)	○	○	○	○	○
55. Pipe (Tobacco)	○	○	○	○	○
56. Alcohol (beer, wine, wine coolers, liquor)	○	○	○	○	○
57. Marijuana (hashish or hash oil)	○	○	○	○	○
58. Cocaine	○	○	○	○	○
58. Crack	○	○	○	○	○
60. Inhalants (glue, fumes, amyls)	○	○	○	○	○
61. Amphetamines (uppers)	○	○	○	○	○
62. Ritalin (non-prescribed use only)	○	○	○	○	○
63. Methcanthinone (cat)	○	○	○	○	○
64. Tranquilizers or Sleeping Pills (downers) (non-prescribed)	○	○	○	○	○
65. Narcotics (opium, morphine, codeine) (non-prescribed)	○	○	○	○	○
66. Heroin	○	○	○	○	○
67. LSD (acid)	○	○	○	○	○
68. MDMA (ecstasy, XTC, X)	○	○	○	○	○
69. Other Psychedelics (psilocybin, mescaline, etc.)	○	○	○	○	○
70. Rohypnol (Roofies)	○	○	○	○	○
71. GHB	○	○	○	○	○
72. Steroids (non-prescribed use)	○	○	○	○	○
73. A needle or syringe to inject a drug	○	○	○	○	○

ANNUAL USE

HOW MANY TIMES IN THE LAST YEAR HAVE YOU USED. . .?

	Never	1-5 Times	6-19 Times	20-40 Times	More than 40 Times
74. Snuff/Smokeless tobacco	○	○	○	○	○
75. Cigars (tobacco)	○	○	○	○	○
76. Pipe (Tobacco)	○	○	○	○	○
77. Alcohol (beer, wine, wine coolers, liquor)	○	○	○	○	○
78. Marijuana (hashish or hash oil)	○	○	○	○	○
79. Cocaine	○	○	○	○	○
80. Crack	○	○	○	○	○
81. Inhalants (glue, fumes, amyls)	○	○	○	○	○
82. Amphetamines (uppers)	○	○	○	○	○
83. Ritalin (non-prescribed use only)	○	○	○	○	○
84. Methcanthinone (cat)	○	○	○	○	○
85. Tranquilizers or Sleeping Pills (downers) (non-prescribed)	○	○	○	○	○
86. Narcotics (opium, morphine, codeine) (non-prescribed)	○	○	○	○	○
87. Heroin	○	○	○	○	○
88. LSD (acid)	○	○	○	○	○
89. MDMA (ecstasy, XTC, X)	○	○	○	○	○
90. Other Psychedelics (psilocybin, mescaline, etc.)	○	○	○	○	○
91. Rohypnol (Roofies)	○	○	○	○	○
92. GHB	○	○	○	○	○
93. Steroids (non-prescribed use)	○	○	○	○	○
94. A needle or syringe to inject a drug	○	○	○	○	○

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USE IN PAST MONTH

HOW MANY TIMES IN THE PAST MONTH (30 DAYS) HAVE YOU USED. . .?

	Never	1-5 Times	6-19 Times	20-40 Times	More than 40 Times
95. Snuff/Smokeless tobacco	○	○	○	○	○
96. Cigars (tobacco)	○	○	○	○	○
97. Pipe (Tobacco)	○	○	○	○	○
98. Alcohol (beer, wine, wine coolers, liquor)	○	○	○	○	○
99. Marijuana (hashish or hash oil)	○	○	○	○	○
100. Cocaine	○	○	○	○	○
101. Crack	○	○	○	○	○
102. Inhalants (glue, fumes, amyls)	○	○	○	○	○
103. Amphetamines (uppers)	○	○	○	○	○
104. Ritalin (non-prescribed use only)	○	○	○	○	○
105. Methcanthinone (cat)	○	○	○	○	○
106. Tranquilizers or Sleeping Pills (downers) (non-prescribed)	○	○	○	○	○
107. Narcotics (opium, morphine, codeine) (non-prescribed)	○	○	○	○	○
108. Heroin	○	○	○	○	○
109. LSD (acid)	○	○	○	○	○
110. MDMA (ecstasy, XTC, X)	○	○	○	○	○
111. Other Psychedelics (psilocybin, mescaline, etc.)	○	○	○	○	○
112. Rohypnol (Roofies)	○	○	○	○	○
113. GHB	○	○	○	○	○
114. Steroids (non-prescribed use)	○	○	○	○	○
115. A needle or syringe to inject a drug	○	○	○	○	○

HOW TRUTHFULLY DID YOU ANSWER THESE QUESTIONS?

○ Not truthfully at all ○ Somewhat truthfully ○ Quite Truthfully

YOU HAVE COMPLETED THE SURVEY!
THANK YOU!

SMITH-MODIFIED AHRBS INSTRUMENT

APPENDIX D

THE SMITH-MODIFIED ADOLESCENT HEALTH RISK BEHAVIOR SURVEY

INSTRUMENT CODEBOOK

Biopsychosocial Model Constructs & Dimensions	**SM-AHRBS Items**
Self-Perception	
Impulse Control	1, 2, 3, 4
Body Image	5, 6, 7, 8, 9
Mastery of the External World	10, 11
Perceptions of the Social Environment	
Perceived Peer Disapproval	24, 25, 26, 27, 28
Perceived Parental Disapproval	29, 30
Perceived Peer Behavior	31, 32, 33, 34
Risk Perceptions	
Alcohol-Related Risk Perceptions	35, 36, 37, 38, 39
Illicit Drug-Related Risk Perceptions	40, 41
Alcohol-Related Risk Perceptions for Peers	42, 43, 44
Illicit Drug-Related Risk Perceptions for Peers	45, 46
Risks versus Benefits	47, 48
Characteristics of the Peer Group	
Characteristics of the Peer Group	49, 50, 51, 52

APPENDIX E

INSTITUTIONAL REVIEW BOARD DOCUMENTS

TEXAS A&M UNIVERSITY
VICE PRESIDENT FOR RESEARCH - OFFICE OF RESEARCH COMPLIANCE

1186 TAMU
College Station, TX 77843-1186
1500 Research Parkway, Suite B-150

979.458.1467
FAX 979.862.3176
http://researchcompliance.tamu.edu

Institutional Biosafety Committee | Institutional Animal Care and Use Committee | Institutional Review Board

DATE: 25-Sep-2006

MEMORANDUM

TO: MCKYER, ELLISA LISAKO
TAMU-HEALTH & KINESIOLOGY(00047)

FROM: Office of Research Compliance
Institutional Review Board

SUBJECT: Initial Review

Protocol Number:	2006-0522
Title:	Impacts of Social and Environmental Factors in the Formation of Adolescent Health-Endangering Behaviors
Review Category:	Exempt from IRB Review

The Institutional Review Board (IRB) has determined that the referenced protocol application meets the criteria for exemption and no further review is required. However, any amendment or modification to the protocol must be reported to the IRB and reviewed before being implemented to ensure the protocol still meets the criteria for exemption.

This determination was based on the following Code of Federal Regulations:
(http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm)

45 CFR 46.101(b)(4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Provisions:

This electronic document provides notification of the review results by the Institutional Review Board.

TEXAS A&M UNIVERSITY
DIVISION OF RESEARCH AND GRADUATE STUDIES - OFFICE OF RESEARCH COMPLIANCE
1186 TAMU, General Services Complex
College Station, TX 77843-1186
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Institutional Biosafety Committee | Institutional Animal Care and Use Committee | Institutional Review Board

DATE: 25-Jun-2008

MEMORANDUM

TO: MCKYER, ELLISA LISAKO
77843

FROM: Office of Research Compliance
Institutional Review Board

SUBJECT: Amendment

Protocol Number:	2006-0522
Title:	Impacts of Social and Environmental Factors in the Formation of Adolescent Health-Endangering Behaviors
Review Category:	Exempt from IRB Review

It has been determined that the referenced protocol application meets the criteria for exemption and no further review is required. However, any amendment or modification to the protocol must be reported to the IRB and reviewed before being implemented to ensure the protocol still meets the criteria for exemption.

This determination was based on the following Code of Federal Regulations:
(http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm)

45 CFR 46.101(b)(4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Provisions: Addition of Matthew Smith and Sasha Fleary as co-investigators.

This electronic document provides notification of the review results by the Institutional Review Board.

VITA

Name: Matthew Lee Smith

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B.S., Public Health Education, Indiana University – Bloomington, 2002

M.P.H., Public Health, Indiana University – Bloomington, 2004

Ph.D., Health Education, Texas A&M University, 2008

Professional Experience:

Instructor, Department of Health and Kinesiology, Texas A&M University, 2008

Graduate Research Assistant, Child & Adolescent Health Research Lab, Department of Health and Kinesiology, Texas A&M University, 2007-present

Host/Producer, Brazos Valley Health, KEOS 89.1 FM, Bryan, TX, 2006-present

Legislature Committee Chair, Texas School Health Association, 2006-present

President/Director, MLS Health Services, Incorporated, 2004-2006

Instructor, Department of Applied Health Science, Indiana University, 2005-2006

Public Health Investigator & Health Educator, Indiana State Department of Health, 2004-2005

Research Assistant, *Kinsey Institute for Sex, Gender, & Reproduction*, Indiana University, 2002-2004

Professional Affiliations:

American Public Health Association
American Association for Health Education
American Academy of Health Behavior
Eta Sigma Gamma National Health Honors Society
Indiana Association of Prevention Professionals
National Commission for Health Education Credentialing, Inc.
Society of Public Health Educators
Southwest Educational Research Association
Texas School Health Association